

# PUBLIC WORKS

**July**  
**1953**

---

Cost Breakdown for Municipal  
Refuse Incineration

---

Public Works Program  
for Savannah AEC Area

---

Hot Plant Mix Pavement  
is Economical for County

---

Procedures in Laying a  
Submarine Water Main

---

Sewage Treatment on  
Pay-As-You-Go Basis

---

Disposal of Wastes from  
Water Treatment Plants

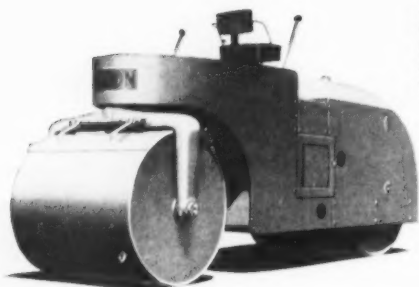
---

How to Design Bituminous  
Concrete Paving Mixtures

---



**Peter C. Karalekas, Sup't. and Chief Engineer of the Springfield, Mass., Water Dep't., at the Provin Mt. aerator. More on page 24.**



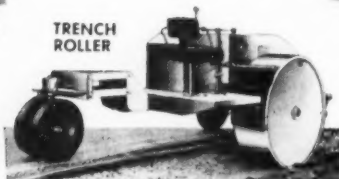
**TANDEM ROLLERS**  
Variable Weight: 5-8,  
8-12, and 10-14 Ton  
Sizes. Gasoline or Diesel  
Engine.



**THREE-WHEEL ROLLERS**  
6, 7, 8, 10 and 12-Ton Sizes. With  
Cast or Variable Weight Ballast-  
able Steel Rolls. Gasoline or Diesel  
Engine.



**SMALL TANDEM ROLLER**  
Variable Weight, 3-5 Ton.  
Gasoline Engine.



**TRENCH  
ROLLER**



**PORTABLE ROLLER**  
Variable Weight,  
7100-9765 lbs.  
Gasoline Engine.

**GALION  
HAS  
THE  
ANSWER  
!**

### BUILT-IN VALUES

GALION has had forty-six years  
of experience building-in the  
values that mean the most to  
you —

**JOB PERFORMANCE  
VERSATILITY  
DEPENDABILITY  
ECONOMY  
SIMPLE OPERATION  
EASY MAINTENANCE  
LONG LIFE**

Write for literature on the type  
and size of equipment in which  
you are interested.

**THE GALION IRON WORKS & MFG. CO.**  
General and Export Offices  
Galion, Ohio, U.S.A.  
Cable address: GALIONIRON, Galion, Ohio

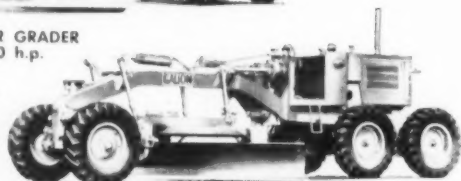
**FOR  
YOUR  
ROLLER  
AND  
GRADER  
NEEDS**



**No. 503 MOTOR GRADER**  
Economy-Size, 40 h.p. Gasoline  
Engine. Diesel Engine  
available.



**No. 303 MOTOR GRADER**  
Medium-Duty, 50 h.p.  
Diesel Engine.  
Gasoline Engine  
available.



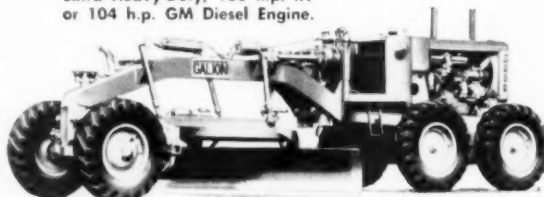
**No. 203 MOTOR GRADER**  
Medium Heavy-Duty, 70 h. p.  
Diesel Engine. Gasoline Engine  
available.

**ESTABLISHED  
GALION  
1907**



**No. 104 MOTOR GRADER**  
Heavy-Duty, 76 h.p. IH or 85 h.p.  
GM Diesel Engine. Gasoline Engine  
available.

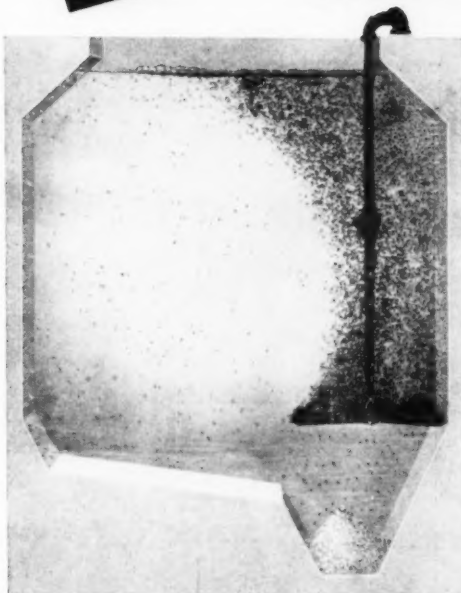
**No. 118 MOTOR GRADER**  
Extra Heavy-Duty, 100 h.p. IH  
or 104 h.p. GM Diesel Engine.





CHICAGO  
SEWAGE  
EQUIPMENT

## AER-DEGRITTER



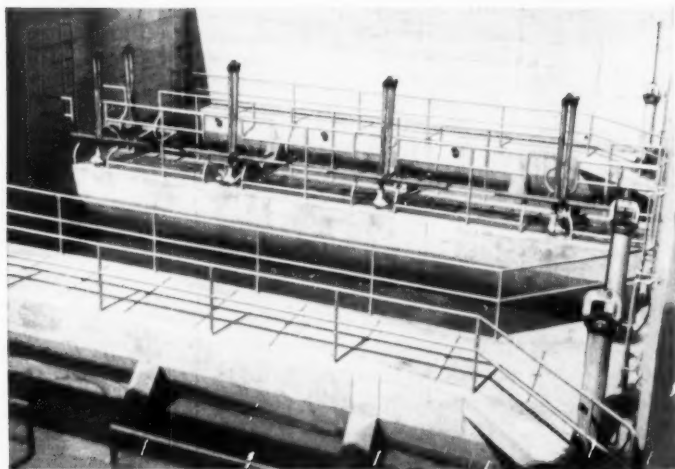
The only method of removing grit and sand from sewage without mechanical equipment is provided by the Aer-Degritter. The velocity of flow is controlled by air introduced through Swing Diffusers and Precision Diffuser Tubes. All sand of 0.2 mm. (65 mesh) and larger is washed and deposited in the bottom of the tank.

Less than 10% volatile matter and only a negligible trace of putrescible organics remains in the grit removed. Aer-Degritters may be installed ahead of all mechanical equipment because coarse sewage material will not interfere with the operation of the Aer-Degritter or affect the hydraulic design of the plant.

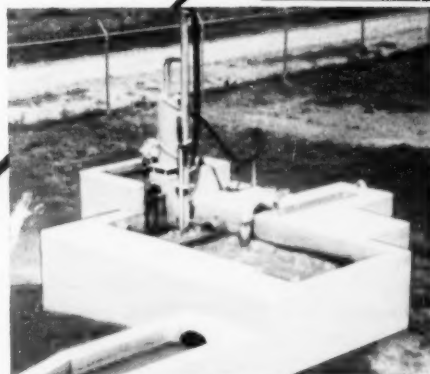
The basic features of the Aer-Degritter are:

- MAXIMUM REMOVAL • CLEAN GRIT
  - NO MECHANISM • LOW COST
  - SIMPLE STRUCTURE • AIR CONTROLLED
- VELOCITIES INDEPENDENT OF FLOW

52  
INSTALLED  
IN  
TWO YEARS



COLUMBUS OHIO SEWAGE TREATMENT PLANT  
Design Flow 160 M.G.D.  
PAUL A. UHLMANN & ASSOCIATES  
Consulting Engineers



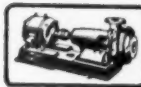
BELLAIRE, TEXAS SEWAGE TREATMENT PLANT  
Design Flow .8 M.G.D.  
HILTON & COULSON  
Consulting Engineers

## CHICAGO PUMP COMPANY

### SEWAGE EQUIPMENT DIVISION

622 DIVERSEY PARKWAY

Flush Klean, Scrub-Peller, Plunger.  
Horizontal and Vertical Non-Clogs  
Water Seal Pumping Units, Samplers.



CHICAGO 14, ILLINOIS

Swing Diffusers, Stationary Diffusers,  
Mechanical Aerators, Combination  
Aerator-Clarifiers, Comminutors.

Now's the time to mail this month's Readers' Service card.



Mr. Hickok's HT4 Shovel loading chert from the county's own pit. The shovel's 80-inch wide, 1 1/4-yd. bucket is wider than the tractor itself, providing a smooth maneuvering surface.

## "... NO equipment serves or wears like CAT\* equipment"

That's *experience* talking! County Superintendent Stacy Hickok of Lawrenceburg, Tenn., who makes the statement, has been building and maintaining roads for 28 years!

Right now he's building 11 miles of gravel road and maintaining approximately 3,000 miles more, with the help of the Cat HT4 Shovel you see above, a Cat No. 12 Motor Grader and a Cat D7 Tractor.

Caterpillar Shovels are world-famous for strength, toughness and durability. Operators like them because of the non-oscillating track frame which gives greater stability . . . the automatic tip-back which keeps the bucket full at all times . . . the positive, clean dumping of even the stickiest materials . . . and the shovel's ability to raise and dump at the same time. Visibility is excellent—Cat Shovels can work in low-overhead areas and

get in and out of tight places easily. Controls are conveniently placed.

Your dealer can provide fast, efficient service with his staff of highly skilled mechanics and complete supply of genuine Caterpillar parts. Call him for an on-the-job demonstration.

Caterpillar Tractor Co., Peoria, Illinois.

# CATERPILLAR\*

\*Both Cat and Caterpillar are registered trademarks—©

**NAME THE DATE...  
YOUR DEALER  
WILL DEMONSTRATE**

## OFFICERS

W. A. Hardenbergh, President  
Croton Morris, V. Pres. & Treas.  
A. Prescott Folwell, Secretary

## EDITORIAL DEPARTMENT

### Editors

A. Prescott Folwell  
W. A. Hardenbergh

### Managing Editor

Edward B. Rodie

### Highway Consultant

George E. Martin

### Editorial Assistant

Helen E. Quinn

### Columnists

George E. Symons  
Leo J. Ritter, Jr.

### Art Consultant

Nathaniel Pousette-Dart

## BUSINESS DEPARTMENT

### General Manager

Croton Morris

### Director, Advertising and Research

Arthur K. Akers

### Production Supervisor

I. James Barger

### Circulation Supervisor

Edward B. Rodie

## ADVERTISING OFFICES

New York 17, 310 East 45th St.  
L. C. Morris, Eastern Sales  
Mgr.

Chicago 11, Ill.  
612 N. Michigan Ave.  
Robert J. Shea, Mid-West  
Sales Mgr.

Cleveland 10, Ohio, Villa Beach  
2, 15445 Lake Shore Blvd.  
Burton M. Yost, District Mgr.

Los Angeles 14, Calif.  
Halliburton Bldg., Suite 318  
Simpson-Reilly, Ltd.

San Francisco 3, Calif.  
Central Tower, Suite 814  
Simpson-Reilly, Ltd.



Public Works T. M. Reg. U.S. Pat. Off.

Published Monthly by Public Works Journal Corporation. Office of Publication at Orange, Conn. Editorial and Advertising offices at 310 East 45th Street, New York 17, N. Y. Subscription rates: U.S.A. and possessions, \$3.00. All other countries, \$4.00. Single copies 50¢ each, except special issues which are \$1.00. Acceptance under Section 3464 P. L. & R. Authorized.

Copyright 1953 by

PUBLIC WORKS JOURNAL CORP.  
310 East 45th St., New York 17, N. Y.

## PUBLIC WORKS MAGAZINE



## CONTENTS FOR JULY, 1953

Public Works For a Boom Defense Area. By Pere F. Seward .....	51
Hot Plant Mix is Economical. By P. S. Banaszek .....	54
Mesa Air Maps Prove Valuable Tools. By Dean Smith .....	57
Sewage Treatment on Pay-As-You-Go Basis. By J. L. Morrison .....	58
Development of an Industrial Water System. By R. C. Lewis .....	60
Research on Industrial Wastes as Related to Water Supply. By C. C. Ruchhoft .....	61
How Industry Makes a Waste Survey. By J. E. Cooper .....	61
Increasing Water Resources Through Cloud Seeding. By Irving Krick .....	61
Details of a Prestressed Concrete Bridge. ....	62
How to Design a Bituminous Concrete Mixture. By J. E. Myers .....	63
Waste Treatment Methods and Economies. By R. L. Smith and R. J. Ellison .....	65
Breaking a Water System Bottleneck. By V. C. Francis .....	67
Rubber in Pavements—A Progress Report .....	69
Costs of Municipal Refuse Incineration. By W. M. Jarrett .....	71
Disposal of Wastes from Water Treatment Plants. By H. H. Mace .....	73
A Better Method of Earthwork Computation. By T. E. Nicholas .....	74
How a Submarine Water Main was Laid. By A. R. MacPherson .....	76
Standard Practice for Street Lighting .....	79
Influence of Highway Design on Highway Accidents .....	79
The Highway Program of Wayne County .....	80
Roadside Vegetative Cover .....	84
Los Angeles Study Reveals Freeway Benefits .....	96
Per Capita Use of Water in Schools. By K. S. Wisniewski and Max Garber .....	97
Utilization of Toronto's Refuse. ....	103

The Water Works Digest .....	92
The Highway and Airport Digest .....	100
The Sewerage and Refuse Digest .....	106

The Editor's Page .....	7	Lighting and Traffic Control .....	79
Leo Ritter .....	14	APWA News .....	83
"Doc" Symons .....	16	Washington News Letter .....	86
Letters to the Editor .....	20	New Public Works Equipment .....	115
Leaders in Public Works .....	24	Public Works Engineering Notes .....	121
The Engineers' Library .....	23	Worth Telling. By A. K. Akers .....	122

The 1953 volume of Public Works will be available on microfilm through University

Microfilm, 313 N. First St., Ann Arbor, Mich.

**THE MOST USEFUL ENGINEERING MAGAZINE  
FOR CITIES, COUNTIES AND STATES**

## Test Rubber Roads in YOUR COMMUNITY To S-T-R-E-T-C-H Your Highway Dollars



### Natural Rubber Roads . . . Newest Highway Advance

Laboratory tests to date indicate that natural rubber powder added to ordinary asphalt paving mix will build roads that last longer, require less repair, and are less costly in the long run. When proven, this means savings of millions of dollars for the taxpayer. Natural rubber-asphalt test roads have already been laid in nineteen states in the U. S. and in several provinces of Canada.

### Test Rubber Roads for Yourself

This year scores of towns and cities all over the nation are testing this promising new development. By paving a block with natural rubber-asphalt, any town or city can make its own test inexpensively under its particular climate and traffic conditions to find out how much money rubber roads could save them in years to come.

A natural rubber test section is easy to lay. It requires only the addition of a small amount of natural rubber powder to the mix, with no change in conventional paving methods or equipment. The rubber powder costs less than

with  
**NATURAL  
RUBBER!**

\$500 for the average block. For complete information that will tell you how to Pave-A-Block and test rubber roads in your community, just mail the coupon.

### Natural Rubber Bureau

1631 K Street, N. W., Washington 6, D. C.

Natural Rubber Bureau Research Laboratory,  
Rosslyn, Virginia

#### Natural Rubber Bureau

1631 K Street, N. W., Washington 6, D. C.

Please send me, without obligation, information on how to PAVE-A-BLOCK with natural rubber-asphalt road surfacing.

NAME

TITLE

STREET

CITY  STATE



Need more facts about advertised products? Mail your Readers' Service card now.



## THE EDITOR'S POINT OF VIEW



### Fringe Areas—An Unsolved Problem and a Great Opportunity

THE "rural-city" dweller is a person who wants to live outside of city limits, yet demands all of the comforts and conveniences of life. You can't blame him for this, but he does create problems. He lists among his primary wants water, gas, telephone, electricity, paved streets and refuse collection. He has never been taught to want also an adequate sewerage system and a treatment plant, so he settles for a cesspool or septic tank. And after a little buck-passing and general compromising, the health organizations let him get away with it even though they know the situation is unsatisfactory. In the meantime, the private utilities go ahead and install their services on a sound basis.

Many of our health departments, both local and state, are so steeped in the regulatory and judicial phases of their jobs that they wait for the mountain to come to Mahomet; and it doesn't come. We appreciate that it costs money to build sewers and treatment plants, though probably no more than for substitutes; and we understand the long-winded legal and administrative procedures usually required. But laws can be changed and procedures simplified if someone will take the leadership.

We need a fresh and realistic viewpoint and this is a place where health department engineers have a great opportunity. Let them devise a sound procedure; let them unite health agencies in asking legislatures to modernize and streamline procedures for sewerage; let them step out and sell this kind of needed sanitation. Here is a wide open field, alike in need and in opportunity. Are our engineers equal to the occasion?

### Do We Need A New Surface Treating Material?

TEN or fifteen years have passed since the beginning of extensive resurfacing projects using bituminous concrete. Many of the older installations are showing the need of some surface maintenance to renew their youth. No highway official can close these highways in the face of the present traffic demand; nor does he want to interfere with the flow of traffic any more than he has to. This seems to point to a liquid surface treating mate-

rial which can be applied at a low amount per square yard—one-tenth gallon or less—which will require no covering material and which will dry in a very short time—thirty minutes or less. It must not produce a slippery condition and should protect the surface of the bituminous concrete for at least five years. Many available materials will meet one or more of these requirements but, so far as we know, none will satisfy all of them. Whoever can produce a surface treating material of this sort—bituminous or something new—will find a large and growing market ready and waiting.

### Who Knows What You're Doing?

EVERYONE dealing with public works is necessarily involved in public relations, but whether these relations are good or bad depends largely on planning and foresight. Even though all municipal departments are concerned with the betterment of the community, the public too often takes them for granted and seems aware of their functions only when temporary inconvenience is caused by new construction and/or routine maintenance. It's up to you to use the positive type of public relations that will make your work appreciated.

Certainly it is better to spend a little time giving advance notice of your projects than to spend the same time trying to mollify an irate citizenry which has been inconvenienced by necessary public work. On the job site, use signs that emphasize the benefits of new utilities, wider streets or other improvements, as well as warning of construction dangers. This approach is being used effectively by many State highway departments, and could well be applied at any community level. Keep your local newspaper informed on the progress of your jobs. Help get pictures to accompany newspaper stories. You know how many people like to watch construction work; all these people will be interested in construction pictures too. Any type of publicity that results in public understanding of your problems will mean better cooperation on all future programs.

Remember, part of your job is to let your fellow citizens know, for instance, why their roads are torn up and when things will be returned to normal, so be sure they know what you're doing. It will help.

# Buries 27 Years of



## 1. PREPARES THE SITE.

In 2-yard loads, the strong steel jaws of the Drott Bullclam remove earth to form a trench where waste will be buried.



## 2. CRUSHES AND COMPACTS REFUSE.



## 3. DIGS AND TRANSPORTS EARTH COVER.

Each day's layer of crushed refuse is promptly covered with fresh, clean earth. As a result, people living nearby have compliments instead of complaints.



## 4. SPREADS AND GRADES FINISHED AREA.

# complaints in 3 Weeks

## International Crawler-Bullclam unit turns smelly city dump into sanitary fill at Highland Park, Illinois

For 27 years, incinerator fumes and accumulated waste made the city dump at Highland Park a place that was liked only by rats. Then an International Crawler with a Drott Bullclam came in and the rats went out—and so did the fire in the incinerator.

Digging trenches, shoveling waste into them, smashing it flat and spreading earth over it, the Crawler-Bullclam completely covered the old dump in three weeks... now buries each day's waste under fresh, clean earth.

"This dump used to be so rat infested," says Sanitary Department Superintendent, Lloyd Botker, "that commercial exterminators once killed 900 here in a single day. But, with our Crawler-Bullclam on the job, we've got rid of rats as well as the source of former complaints from our citizens."

The Drott sanitary-fill method of waste and garbage disposal not only keeps nearby residents happy but turns swamps, gullies, and worthless acres into valuable land. And the Crawler-Bullclam is *the only one-man unit specifically designed to handle all four steps of the job.*

In addition, our engineers, who have pioneered this method of sanitary-fill across the country, help you select your site and train your operators.

See your International Industrial Distributor for details. Or write today to:

**Drott Manufacturing Corporation, Milwaukee 8, Wis.  
International Harvester Company, Chicago 1, Illinois**



With International power behind it, the specially curved Bullclam front crushes the rubbish flat.



When a sanitary-fill is finally finished, the result is high, level ground suitable for parks, airstrips, factory sites or housing developments.

BULLCLAM BY



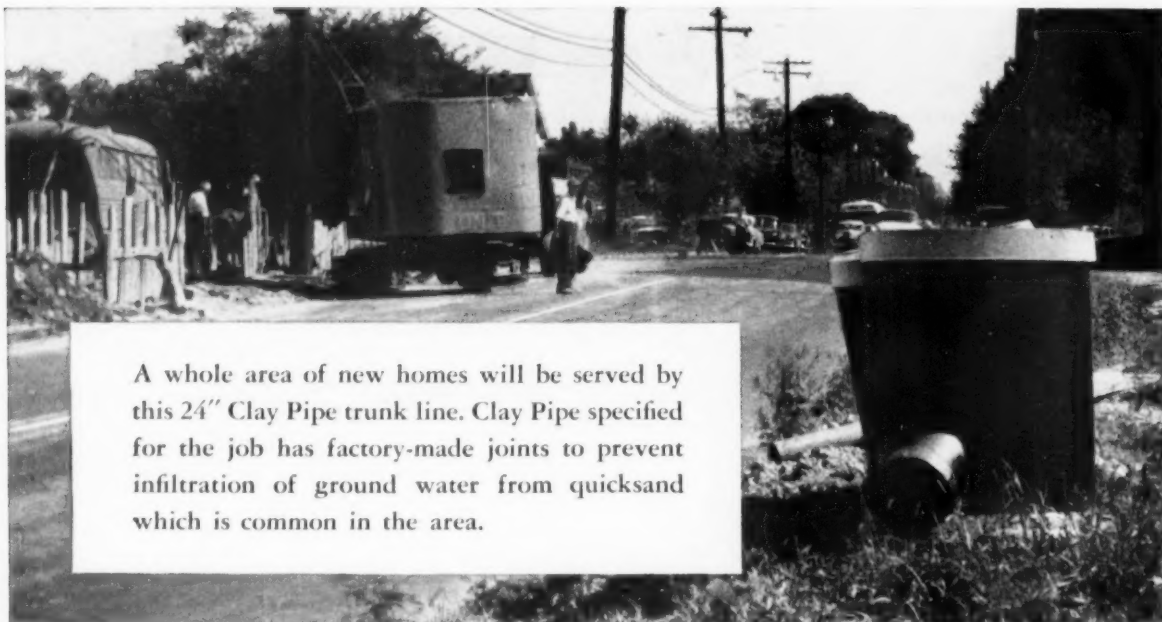
**DROTT**

POWER BY



**INTERNATIONAL**

POWER THAT PAYS



A whole area of new homes will be served by this 24" Clay Pipe trunk line. Clay Pipe specified for the job has factory-made joints to prevent infiltration of ground water from quicksand which is common in the area.

## "You can install Clay Pipe with Confidence"

**. . . SAYS JOHN R. CLOYD, CITY ENGINEER IN CHARGE OF THIS TRUNK-LINE SEWER PROJECT IN ROCKY RIVER, OHIO.**

Rocky River, a suburb of Cleveland, is having the same growing pains that are cramping thousands of other communities located near big defense-industry centers. And Rocky River engineers, like those in so many other cities, are taking advantage of plentiful Clay Pipe to provide never-wear-out sanitary protection for the area.

Vitrified Clay Pipe is *guaranteed for half a century*. That's especially important

when sewerage works are financed by bond issues, because Clay Pipe can't fail before the bonds are retired. Clay Pipe can't be weakened by strong detergents, corrosive liquids, or sewage gases. Rotary cleaning machines can't damage it. As Engineer Cloyd says, "Having used a good many miles of Clay Pipe over the years, I have no fear as to the lasting qualities of Clay Pipe for this or any similar installation." It's the *one* pipe that *never wears out!*

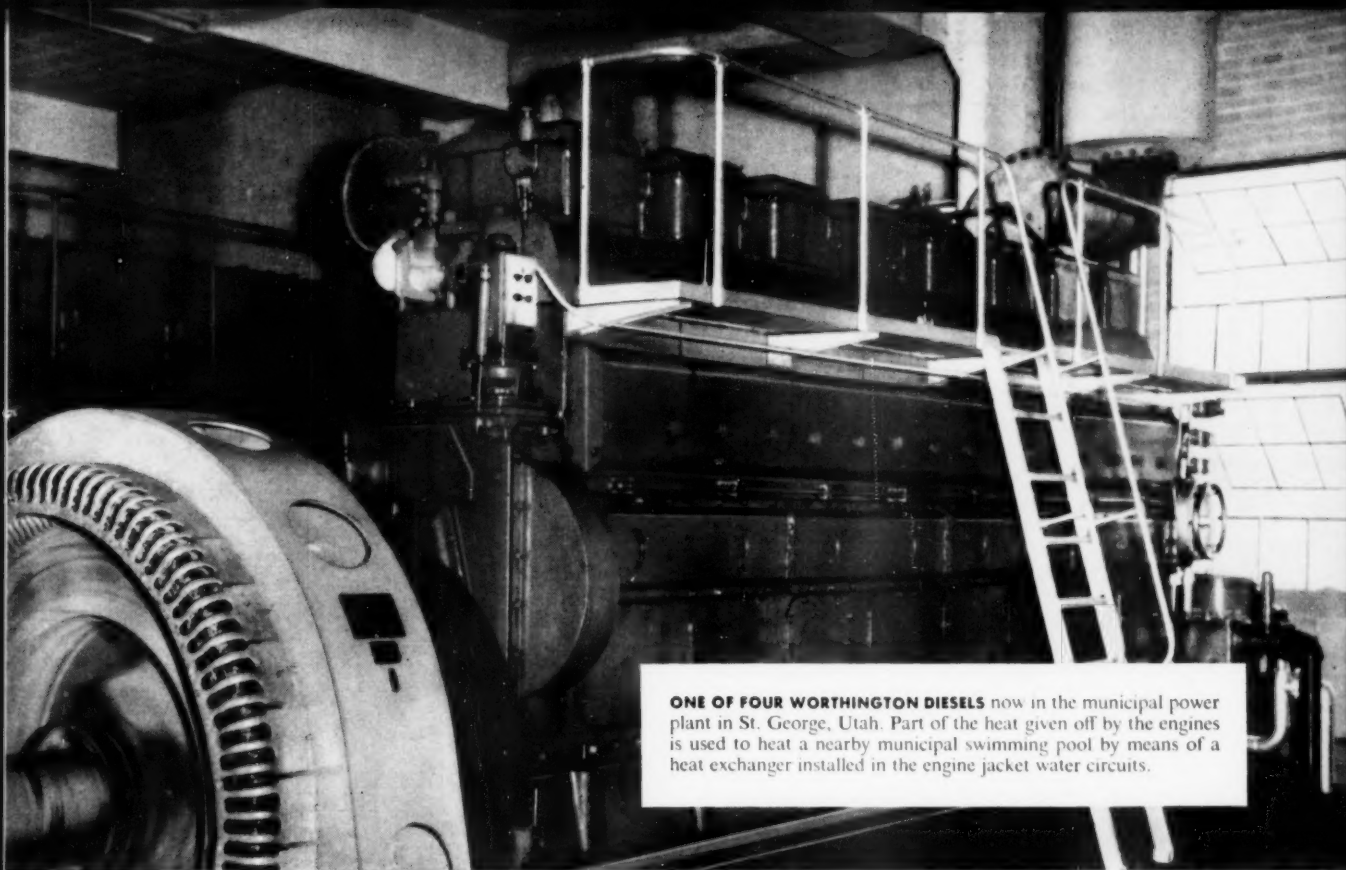
### **NATIONAL CLAY PIPE MANUFACTURERS, INC.**

1520 18th St. N. W., Washington 6, D. C.  
206 Connally Bldg., Atlanta 3, Ga.  
100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.  
703 Ninth & Hill Bldg., Los Angeles 15, Calif.  
311 High Long Bldg., 5 E. Long St., Columbus 15, Ohio

**ESSENTIAL • ECONOMICAL • EVERLASTING**





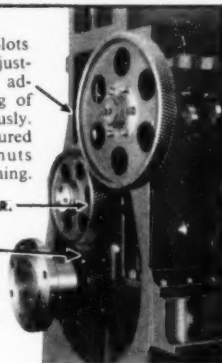


**ONE OF FOUR WORTHINGTON DIESELS** now in the municipal power plant in St. George, Utah. Part of the heat given off by the engines is used to heat a nearby municipal swimming pool by means of a heat exchanger installed in the engine jacket water circuits.

**MAIN CAMSHAFT GEAR.** Slots in gear provide single adjustment for retarding or advancing injection timing of all cylinders simultaneously. Final gear adjustment secured with castellated locknuts wired after final tightening.

**FREE FLOATING IDLER GEAR.**

**SPLIT GEAR KEYED ON CRANKSHAFT.** Permanent adjustment for perfect alignment with idler gear is easily accomplished.



**WORTHINGTON HELICAL STEEL GEAR TRAIN**  
used on these Worthington dual fuel engines . . .

1. Provides accurate and positive control of engine timing.
2. Is located at flywheel end of engine for smooth gear operation as power impulses are absorbed by the flywheel.
3. Uses controlled automatic oil jet lubrication that eliminates wear.
4. Assures correct engine timing . . . keeps engine running smoothly . . . results in low fuel consumption and minimum engine maintenance.

## Good planning keeps municipal power plant profitable

Eleven years ago, the City of St. George, Utah, started power-plant operations with two Worthington four-cycle, direct injection Diesel engines. Today, the capacity of St. George's plant is 500% greater than it was in 1942—and profits are still being returned to the City of St. George.

St. George planned its power plant to keep pace with increasing power needs and to continue to show profits. That's where Worthington came in. Worthington engineers helped St. George select exactly the right size and type of equipment—engines, circulating water pumps, fuel transfer pumps and air starting equipment.

Because of its complete satisfaction with the original Worthington units, St. George purchased a third Worthington Diesel in 1947, a fourth in 1949, and a fifth in 1950. At present a total of four units are in operation, one unit having been replaced by a larger unit in 1950.

Worthington may be able to help save power costs for your community, too. Write your nearest Worthington district office or Worthington Corporation, Engine Division, Section E.3.2, Buffalo, New York.

E.3.2

### Worthington-Built Auxiliaries



ENGINE STARTING  
COMPRESSORS



OIL TRANSFER  
PUMPS



COOLING WATER  
CIRCULATING PUMPS



EVAPORATIVE-TYPE  
ENGINE WATER COOLERS

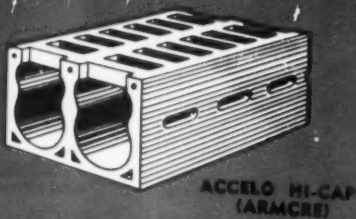
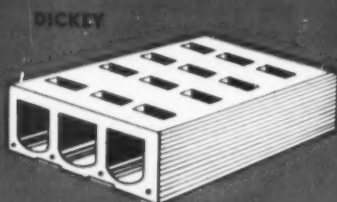
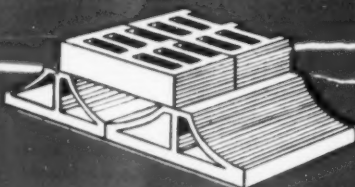
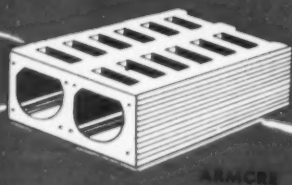
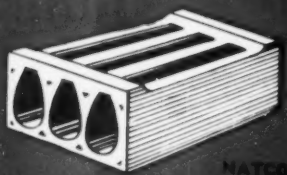
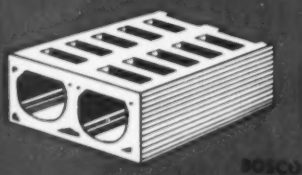
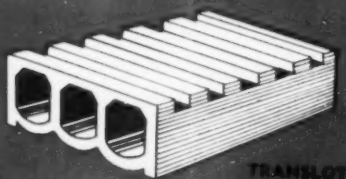
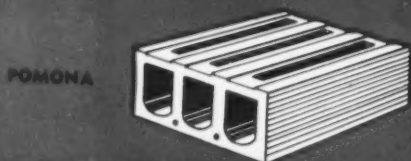
Economical Continuous Power—Diesels, Oil and Dual Fuel, and Spark-Ignition Gas Engines, from 190 to 2,100 bhp.

# WORTHINGTON



## Engines

# FOR BETTER TRICKLING FILTER RESULTS



For more details circle No. 20 on the Readers Service Card

## USE TFFI INSTITUTE SPECIFICATIONS UNDERDRAINS

The scientific design of these *vitrified clay filter bottom blocks* insures trouble-free operation for the life of the filter. They have large top openings. That means proper ventilation of all filter media and free discharge of the filter effluent at all times. They have smooth run-off channels. That means quick drainage and no clogging even with years of operation. The blocks are light in weight, self-aligning and easy for unskilled labor to lay. After they have been laid they are strong enough to work on and to support even very deep filter media.

These modern underdrain blocks will carry applications up to 50 MGAD. They are best for all kinds and shapes of filters. They are used everywhere better operating results are desired.

Use them to insure best results from your next trickling filter. Give it a *specification floor*. Use TFFI *vitrified clay filter bottom blocks*. For full engineering details write any member of this Institute today.



## Here's the Payoff

GREAT NECK, L. I. During the first ten months of 1952, the trickling filter plant at Great Neck, L. I., received raw sewage having an average BOD of 136 ppm and produced an effluent having an average BOD of 19 ppm. Maximum effluent BOD was 22 ppm and minimum was 14.5. Flows averaged slightly over half a million gallons per day. These data are through the courtesy of Arthur Herberger, Sanitary Engineer.



## TRICKLING FILTER FLOOR INSTITUTE

Texas Vitrified Pipe Co.    Natco Corporation    Pomona Terra-Cotta Co.    W. S. Dickey Clay Mfg. Co.  
Mineral Wells, Tex.    Pittsburgh 22, Pa.    Pomona, N. C.    Kansas City 6, Mo.  
Ayer-McCord Clay Co., Inc.    Bowerston Shale Co.    Industrial Materials Co.  
Brazil, Ind.    Bowerston, Ohio    Philadelphia 34, Pa.

For more details circle No. 20 on the Readers Service Card

**FAST, EASY WAY  
TO INSTALL PIPE...  
AT LOWER COST**



**PUSH PIPE UNDERGROUND WITH  
A GREENLEE HYDRAULIC PUSHER**

Here's the simple, cost-cutting way to install underground pipe. Speed your jobs with a GREENLEE Pusher. One-man-operated, portable, simple to operate. No tearing up of pavement... eliminates extensive ditching, tunneling, backfilling, tamping, repaving. Cuts job time to a fraction. GREENLEE Hydraulic Pipe Pusher often pays for itself on first job. Two sizes — model shown above for pushing 3/4" to 4" pipe. Larger unit, below, for pipe over 4", concrete sewer pipe and large drainage ducts. Power pump (as shown above) also available for extra ease and speed of operation.



Write today for descriptive literature. Greenlee Tool Co., 2047 Columbia Avenue, Rockford, Illinois, U.S.A.

**UP FRONT  
FOR  
ADEQUATE  
ROADS**



BY  
**LEO J. RITTER, JR.**  
New York University

**Texas Sand-Clay** — The problem of providing a large mileage of all-weather roads at low cost is one which many small governmental agencies live with perpetually. Some very ingenious approaches are used to help relieve the situation; one of the most ingenious is that worked out by County Commissioner J. F. Bodine of Mitchell County, Texas. In this dry-land county they are building many miles of sand-clay stabilized roads to replace natural earth surfaces composed of blow sand which drifts badly and make driving tough all during the year. There's nothing unusual about sand-clay, but in this case it is unique because a trenching machine is used to bring up the clay which lies beneath the surface sand. The clay is then blended with the sand to make an all-weather road. Clever, these Texans.

**Township Consolidation** Three counties in Illinois—Pulaski, Massac and Williamson—have recently consolidated their township road districts into a county-wide unit. This is a real step forward in the administration of local roads, since it is generally recognized that, in the majority of cases, the township is simply too small to do an effective job of providing adequate local rural roads. Other counties in this state are expected to take similar steps in the near future.

**Legislation** — A number of state legislatures in recent session enacted laws which do much toward advancing the cause of improved highway planning and development. Gasoline tax increases passed in Iowa and Nebraska, while anti-diversion amendments passed in Arizona, Tennessee and Wyoming. Bond issues for highway improvement were voted in New Hampshire and Oregon, while in Maryland a long range highway improvement

program received approval. Widespread public information campaigns, including the effective use of sufficiency ratings, preceded successful action in most of the states concerned. Another kind of legislation—the axle-mile tax—has been approved by the house in Ohio and is making the truckers mighty unhappy.

**Barnes' Dance** — Innovations which have been put into effect to help alleviate Denver's growing traffic problems by H. A. Barnes, Traffic Engineer, have received widespread approval by the public. Included among these things is what Denverites have come to call the Barnes' Dance. The "dance" takes place when, on one of the cycles of the traffic signals at an intersection, all vehicular movement is stopped and pedestrians cross by the shortest possible route. One of the big effects is to permit many more vehicles to make right turns during the portion of the cycle when they are permitted to do so, because of the elimination of pedestrian interference. Other devices, such as one-way streets and progressive signal timing, have greatly improved traffic movement, both downtown and in the outlying areas of Denver.

**Interstate Highway Accident Study** — The results of a very comprehensive study of accidents on main rural roads are reported in the June issue of *Public Roads* magazine. Accident rates on selected sections were related to design features and traffic characteristics. The most significant factors affecting accidents were found to be the number of lanes, volume of traffic, degree of curvature, pavement and shoulder widths, and the percentage of cross traffic at intersections. When traffic volumes are high, lowest accident rates occur on divided highways with controlled access while highest rates occur on three-lane roads. At intersections, the percentage of traffic on the minor road is extremely

(Continued on page 102)



## MONOTUBES TEAM UP WITH FLUORESCENTS FOR a new approach to modern street lighting

*30-foot, fluted steel Monotube poles, spaced at 95 feet, add to the attractive daytime appearance of Oakwood's mile-long fluorescent installation while providing dependable support for the twin luminaires.*



**F**LUORESCENT street lighting shows great promise as an efficient means to more adequate street illumination.

The country's largest installation to date of fluorescent luminaires is operated by the Dayton Power and Light Company on Far Hills Avenue, Oakwood, just outside of Dayton, Ohio.

Union Metal Monotubes were selected because they are ideally suited for this and all types of street lighting requirements.

Write The Union Metal Manufacturing Co., Canton 5, Ohio, for catalogs, specific data or engineering information.

**UNION METAL**  
*Monotube Street Lighting Poles*



## SOIL COMPACTION

For Better,  
Quicker  
STREET  
REPAIRS



## Use BARCO RAMMERS

**H**ERE is a BETTER, QUICKER, CHEAPER way to repair streets when holes or trenches are dug in paved areas. Instead of (1) mounding up the backfill and waiting for it to settle, or (2) using expensive granular replacement fill, do as others are now doing — Use Barco Rammers to get **HIGH DEGREE COMPACTION** of original backfill *immediately*. No waiting to restore paving! No dangerous bumps or holes left in streets! No expensive "call backs" to work on holes! **SAVE WITH BARCO!**

### ASK FOR DEMONSTRATION

The Barco Rammer is a new tool with many uses! Tamps backfill to 95% compaction at amazingly low cost — Let us show you actual figures. Ask for our nearest distributor to give you a demonstration.

• Send for  
CATALOG No. 621

**BARCO  
MANUFACTURING  
COMPANY**  
5301 Hough St.  
Barrington, Ill.  
(A Chicago Suburb)  
**Builders of Portable Gasoline  
HAMMERS and RAMMERS**



## People, Ideas and Events

BY "DOC" SYMONS



**H.T.M.A.** — And true to my promise of last month, this column will be devoted to my trip to Purdue and Grand Rapids, early in May.

We (my girl, Virginia, and I) left Larchmont amid the bloom of tulips and dogwood on a bright May Day. Eighteen days, 2175 miles and 129 gallons of gasoline later, we arrived back at 86 Edgewood to the last blossoms of the azaleas and the incipient flowering of the rhododendron. We had seen spring flowers, red bud, and orchards in full blossom, as well as many more tulips along the way. It was a beautiful time of year.

★ ★ ★

**Small World No. 20** — First night out we stopped at Bedford, Pa., that historic old place where Pres. Buchanan had his summer White House. In the dining room I saw Dr. Rose, a chemistry Prof. from the University of Illinois, when I was there. Later that evening we stepped into the elevator and met a couple who had lived across the street from us a decade ago in Buffalo. Next morning, as we entered the elevator to leave, we met another couple, friends from Buffalo, who didn't know the first couple was in Bedford.—There must be a moral somewhere in this story for men who travel with feminine companions—Small World!

★ ★ ★

Our second night on the road was spent in a Motel—our first experience. Although the accommodations were fine, as the AAA had said, the location was near the intersection of two main routes, with a stop light and an approaching incline to the intersection. I always thought there was too much truck traffic on the roads.—Now I know so!!!

★ ★ ★

On the third day we rolled across Ohio and Indiana farm land, past

the factory of the Ford Meter Box Co. in Wabash (John was in church at the time) and on to W. Lafayette and a two-room suite at the Purdue Union Club. My girl, Virginia, and Don Bloodgood's Margaret being P.E.O.s had much to do while I attended technical sessions, like mad, at Don's famous (this year was No. 8) Purdue Industrial Waste Conference.

★ ★ ★

**Luminous Quotes** — It was while chinning between sessions at Purdue with Ben Barton, the sage of Findlay, Ohio, that I learned his two classifications of industrial wastes, to wit: "Biological and Illogical."

★ ★ ★

Don's show was great as usual, with about 47 papers, of which you could pick 17 or less.—At one bull session Larry Oeming, (Michigan's Steam Control Expert) gave Phil Morgan (Prof. of San. Engr. at Iowa State) quite a ride on how many (or few) hours a week a professor works. Phil stoutly defended the "heavy" work schedule, but did admit that once he gave the same lecture on two different days to the same class—and the students never said a word.

★ ★ ★

After Purdue, a day in my old home town (really) of Danville, Ill., and another day on the campus at the Univ. of Ill., where I saw Harold Babbitt and Pete Wisely, and then on to Grand Rapids, Mich., site of the 73rd AWWA Convention.

★ ★ ★

For two years prior to the meeting there had been considerable talk about "Why are we going to Grand Rapids?"—Apparently that critical attitude arrived with some of the registrants, because griping had begun by the time we arrived on Sat-

(Continued on page 113)

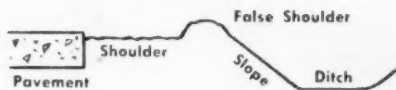
Mr. Public Official:  
Do your highways have a shoulder problem  
that threatens safety . . . causes excessive  
breakups of your paved roads? If so . . .  
here's a practical, economical method  
for first re-shaping, then maintaining those  
shoulders with ONE machine, ONE operator.

# TELEGRAM

## Mr. Public Official:

DO YOUR HIGHWAYS HAVE A SHOULDER PROBLEM  
THAT THREATENS SAFETY . . . CAUSES EXCESSIVE  
BREAKUPS OF YOUR PAVED ROADS? IF SO . . .  
HERE'S A PRACTICAL, ECONOMICAL METHOD  
FOR FIRST RE-SHAPING, THEN MAINTAINING THOSE  
SHOULDERS WITH ONE MACHINE, ONE OPERATOR.

### THE PROBLEM



**CROSS-SECTION** of typical paved road with false shoulder that prevents proper drainage, encourages erosion of shoulder material and damage to pavement.

**ACTUAL PHOTO** of false shoulder, consisting of sod mat 3 to 4 inches high.



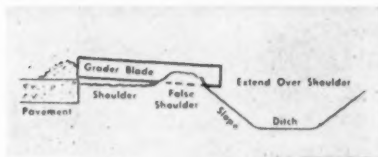
### THE REMEDY



Cut off false shoulder with the Allis-Chalmers Model D's ROLL-AWAY moldboard—roll sod to edge of pavement.



Now slope shoulder with grader moldboard and feather windrow out behind with Shoulder Maintenance Blade.



Set grader moldboard as shown to insure clear cut and eliminate any obstacle to adequate drainage.



The finished job—a smooth, safe, well-drained shoulder.



Windrow of sod consists mainly of root mat. Note that grader blade did not disturb or cut into shoulder gravel.



Load sod into truck with Model D's rear-end loader. Wide bucket lies flat on pavement, picks up cleanly without disturbing shoulder gravel.

**W**ITH false shoulder removed and proper shape re-established, the Allis-Chalmers Model D and rear-end loader with interchangeable Shoulder Maintenance Blade can keep the road in tip-top condition easily and at low cost. It's another money-saving application for the Model D, the most versatile of all motor graders. For more information on shoulder maintenance, write now for Booklet MS-896, or ask your Allis-Chalmers dealer for a demonstration.

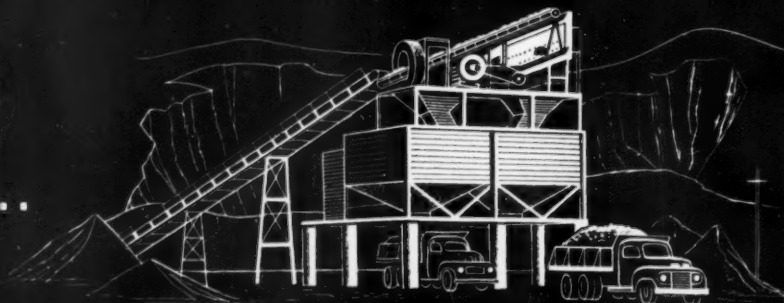
ROLL-AWAY is an Allis-Chalmers trademark



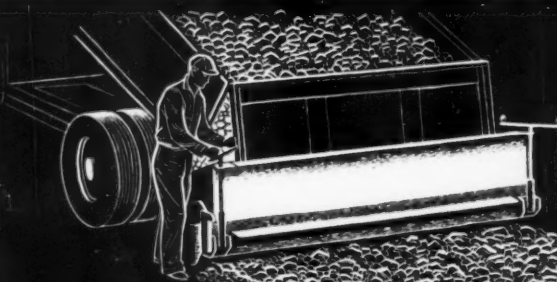
**ALLIS-CHALMERS**  
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

## B I T U M U L S I S V E R S A T I L E

Tonnage is UP  
at the quarry...



Costs are DOWN  
on the job...



when Penetration Macadam  
roads are built with  
Graded Aggregates and BITUMULS®



Typical Bitumuls Full Penetration Macadam Pavement

HERE'S HOW ROAD-BUILDERS avoid the expense of placing and compacting base rock, choke stone and key stone separately in the construction of Penetration Macadam.

Quarry owners are able to make a blended aggregate that has been *graded at the quarry* to provide the specified percentage of each size of stone that assures close interlocking when compacted. The result is higher production for the quarry; savings in time and labor for the Road-BUILDER; better roads at lower costs for the city, county or state.

#### WHY BITUMULS?

Graded aggregate, properly placed and compacted, forms a dense mass with a minimum of voids. *Only* Bitumuls—

applied cold—can *completely* penetrate this dense, closely-interlocked mass, coating each stone with a thin film of pure asphalt. This provides a mud-and-water seal for the pavement base and maintains the maximum bearing strength that is inherent in Bitumuls Full Penetration Macadam.

Full Penetration Macadam is suitable for either new construction or for resurfacing existing pavements.

There are Bitumuls Engineers working out of plants near you. They welcome an opportunity to furnish details on this method of pavement construction, or to discuss other paving problems. From these same plants, Bitumuls in both Quick-Setting and Mixing Grades is available for prompt, on-job delivery.

**AMERICAN  
Bitumuls & Asphalt  
COMPANY**

200 BUSH STREET • SAN FRANCISCO 4, CALIFORNIA

E. Providence 14, R. I. Perth Amboy, N. J. Baltimore 3, Md. Mobile, Ala.  
Columbus 15, Ohio Tucson, Ariz. Seattle, Wash. Baton Rouge 2, La. St. Louis 17, Mo.  
Inglewood, Calif. Oakland 1, Calif. Portland 7, Ore. Washington 6, D. C. San Juan 23, P. R.

Now's the time to mail this month's Readers' Service card.





# SPECIFY RODNEY HUNT

## FOR SLUICE GATES

Standard Sizes: 6" to 108" diameter  
Larger Rectangular Sizes  
for Special Installations

Versatility plus! With new equipment and enlarged facilities, we can meet your specification and delivery requirements for cast iron bronze-mounted sluice gates. Specify exactly the right gate from twelve standard types . . . over 2000 combinations of types and sizes!

Rodney Hunt sluice gates are the product of skilled foundry practice, precision finishing, and carefully engineered construction: they resist deflection and assure dependable, low-maintenance operation.

### Free! 232-page color catalog

This is one of the most complete works in the field. It contains photographs, drawings, specifications and complete descriptions of our sluice gates, timber gates, hoists, valves, racks and rakes, plus a valuable 28-page section of engineering data on hydraulic problems.

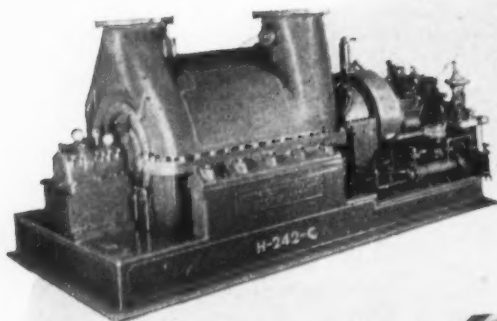
This important catalog was especially prepared and edited for consulting engineers, contractors and other executives who are *actively* engaged in the water control field. Please write on your letterhead for Catalog WCA-952, Rodney Hunt Machine Co., 82 Lake St., Orange, Mass., U.S.A.



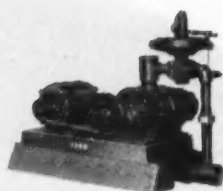
**RODNEY  
HUNT**

**Water Control Apparatus Division**

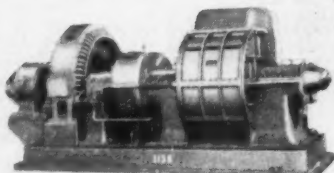
Manufacturing Engineers Since 1840



**CENTRIFUGAL BLOWERS AND EXHAUSTERS**  
single and multi-stage units, in capacities from 2,000 cfm to 100,000 cfm or higher, at maximum practical pressures.



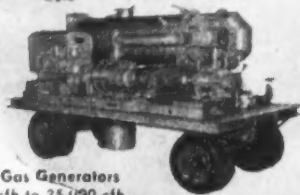
**Rotary Positive Gas Pumps**  
5 cfm to 50,000 cfm.



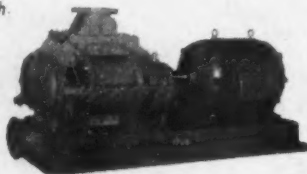
**Rotary Positive Blowers and Exhausters**  
5 cfm to 50,000 cfm.



**Positive Displacement Meters**  
4,000 cfh to 1,000,000 cfh.



**Inert Gas Generators**  
1,000 cfh to 35,000 cfh.



**Cycloidal Vacuum Pumps**  
500 cfm to 13,000 cfm.

**WE *Specialize* IN YOUR PROBLEMS  
OF MOVING GAS OR AIR!**

You may need to move a thimbleful of gas . . . or create a cyclone of whirling air. Whatever your problem, we've probably met something close to it, in experience of almost a century of building such equipment.

Another reason why we know so much about this job is that it's all we do. Our customers range from the "giants of industry" to the neighborhood plant, both of whose production depends upon continuous, reliable, economical performance of air and gas handling units. Because we build the exclusive *dual-ability* line of Rotary Positive and Centrifugal Units, in a wide range of sizes, we offer a *dual choice* which permits completely unbiased recommendations.

So—if you have a problem today—or anticipate one a year or five years from now, we suggest you call upon the facilities of R-C Specialists. Write for bulletins on any specific equipment.

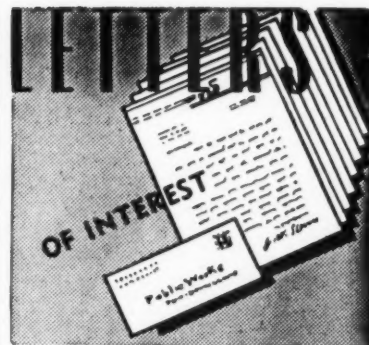
#### **ROOTS-CONNSVILLE BLOWER**

A DIVISION OF DRESSER INDUSTRIES, INC. • 253 Poplar Ave. • Connersville, Indiana

Thousands use our Readers' Service card to keep up to date . . . do you?

### **ROOTS-CONNSVILLE**

*Exclusive  
Specialists  
in Handling  
Gas and Air*



#### **COVER MAN APRIL ISSUE**

I wish it were possible for you to see the many letters that I have received as a result of the picture on the April cover of *Public Works*. I would like some extra copies of this issue.

We may soon have another of the family in the Medical Service Corps. My son Jack, who majored in biology, has filed for a commission (See PW, June, page 151). He has had a good practical background which I hope the Army will be able to use.

You probably remember Miss Carroll (now Mrs. Day) who was with us in Eighth Service Command Headquarters. She recently sent me a clipping from the Dallas paper showing you and Henry Graesser looking over the water situation there. Her comment was that if so many Yankees hadn't decided to stay in Texas after the war, there wouldn't be any water shortage.

C. W. Klassen,  
Chief Sanitary Engineer,  
Dep't. of Public Health,  
Springfield, Ill.

Ed. Note: Query to Mrs. Day: Don't some Texans drink water, too?

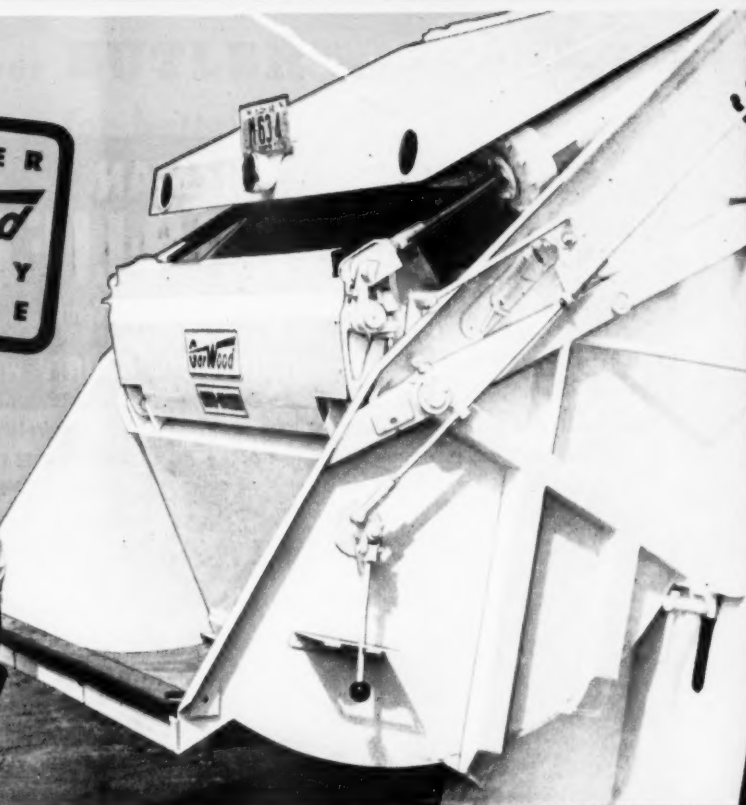
#### **WORD FROM THE NSF**

Recently across my desk came your April, 1953, issue. Inside the front cover were many worthwhile things. As usual, it was a splendid job. With regard to the cover . . . I want to compliment you on the . . . bit of background material that brings out the great theme "Sanitation is a way of life". If you have an extra copy of the April issue, I would certainly like to have it. And loads of good luck to you all.

Walter F. Snyder,  
National Sanitation Foundation,  
School of Public Health,  
University of Michigan.

**CUT  
COSTLY  
CREW  
IDLE  
TIME**

with



## LOAD-PACKER'S 5-SECOND OPERATION

Load-Packer's fast-acting, fully-automatic compaction keeps crews working at a faster, steadier pace all day long . . . cuts refuse collection time and costs . . . speeds refuse collection schedules. Only five seconds of one man's time is required to empty the big loading hopper and compact the refuse into the big Load-Packer body.

Once the ram door is closed and pressure applied, the ram door completes the compacting cycle and re-opens the hopper ready for the next load automatically without further operator attention. The operator is free to make his next pick-up during this automatic compacting cycle. Thus, all the crew spend all their time loading. They collect more

refuse per hour and clear wider areas per day with Load-Packer's faster loading speed—actually up to  $2\frac{1}{2}$  times faster than with other batch-type and travelling bulkhead loaders.

Load-Packer's automatic compacting cycle is controlled by a single, handy lever. Holding the lever in engagement for approximately five seconds closes the ram door and applies power for the compaction stroke. Injury risk is reduced, too, since the ram door floats closed—hand pressure will stop the door at any point in its descent. Power can not be applied until the ram door is fully closed.

Five-second compaction is but one of the many cost-cutting features of Gar Wood Load-Packers. For faster, more efficient and more economical refuse collection in your community get the Load-Packer story from your nearby Gar Wood Dealer . . . or use the coupon below.



**Gar Wood LOAD-PACKER**  
up to  $2\frac{1}{2}$  times faster



**Other batch-type loaders**



**Travelling Bulkhead loaders**



**GAR WOOD INDUSTRIES, INC.**  
WAYNE, MICHIGAN

Gar Wood Industries, Inc. 2M110  
36015 Main St., Wayne, Mich.  
Attn: Customer Service Dep't.

Please send me full facts about cutting refuse collection costs with new, 1953 Gar Wood LOAD-PACKERS.

Name \_\_\_\_\_ Position \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

TRUCK EQUIPMENT: Dump Truck Bodies and Hoists, Winches and Cranes, Refuse Collection Bodies, Elevating End-Gates.  
CONSTRUCTION EQUIPMENT: Excavators, Scrapers, Dozers, Ditchers, Spreaders, Finegraders, Truck-Mounted Road Graders.



Clarence Firestone, foreman  
in charge of equipment for  
Franklin County, Kansas

## PITMAN HYDRA-LIFT

Versatile New Truck Crane...

...a "natural" for county work!

"Every county that does any road and bridge work at all ought to have a Hydra-Lift," says Mr. Firestone. His County government keeps its Hydra-Lift in use constantly handling culverts, "I" beams, timbers, piling, tires and motors of heavy equipment . . . and on many, many similar jobs encountered daily in road and bridge work.



Why is Mr. Firestone so sold on Hydra-Lift for these jobs? The answer is simple: Hydra-Lift lifts up to 6,400 pounds, has a boom which telescopes from 12 to 22 feet. Hydraulic power swings the boom 180°, lifts it through an arc of 100°. Yet this husky, versatile crane requires but 40 inches behind the cab of your truck. You can still use your truck as a hauling vehicle!



Because it does lifting and hauling jobs quicker, easier and with less manpower and less equipment, Hydra-Lift has proved a "natural" for Franklin County. And, whatever your lifting and hauling job, Hydra-Lift can prove a "natural" for you, too!

Write today for further details!

**PITMAN MANUFACTURING COMPANY**  
300 West 79th Terrace                      Kansas City, Missouri

Get full details of this month's new products . . . mail your Readers' Service card today.

### HEAT-TREATING GARBAGE

I read with interest your several articles in the May issue on the above subject. . .

We do not make the cooking vessels, but we do make a steam generator that should be of interest, because it will generate up to 200 p.s.i. steam pressure within two minutes, rather than the thirty to sixty minutes which is required by a conventional steam boiler.

These units are extremely light in weight, portable, and compact in size, and do not require the usual expensive foundations, etc., that are required by a conventional boiler.

Our "Kwik-Steam" Generators are made in sizes ranging from 20 to 165 Boiler Horsepower, and are described in the enclosed Bulletins X-21 and AA-22.

I hope this data will be of some value to you, and will be glad to furnish any additional information you desire.

William H. Schuelie,  
Littleford Bros., Inc.  
545 Fifth Avenue,  
New York 17, N. Y.

We were pleased to see the article "Equipment for Heat-Treating Garbage" which appeared in the May issue of PUBLIC WORKS Magazine.

As you probably know, the joint publication—US Department of Agriculture and US Public Health Service—was rather hastily prepared to meet the existing emergency. As we expected, subsequent experience and brief contacts with field problems indicate that there are a number of items in the bulletin that could be improved upon. We hope that a revision of the bulletin will be possible in the near future so that new information and experiences relative to methods and equipment can be included.

Will you advise us of any useful information you receive as a result of your article.

R. J. Van Derwerker,  
Division of Sanitation,  
PHS, Washington, D. C.

• • •

### Water and Sewer Superintendent Wanted

The City of Fort Lauderdale, Fla., desires applications for Superintendent of Water and Sewer Distribution. Salary range \$400 to \$500 per month. Apply to Civil Service Dep't., City Hall, Fort Lauderdale, Fla. Completed applications must be in before July 25.





## Another **BUTLER** construction feature for better steel buildings

### **RIGID FRAME CONSTRUCTION** gives you full usable space

Clear span interior makes every foot of space in a Butler building fully usable. Rigid frame structural steel members also assure greater strength with less weight for maximum economy. The extra-deep corrugated galvanized or aluminum sheets, bolted and locked to

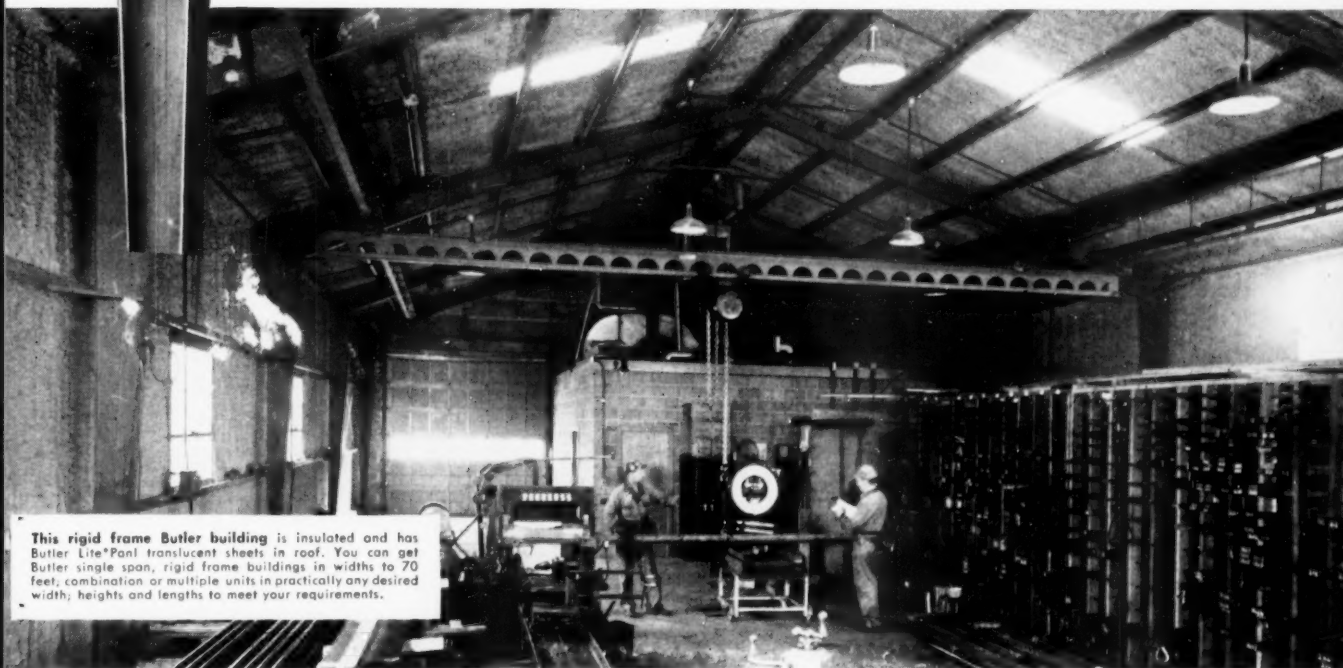
the sturdy framework, stay tight and true through the years. Butler pre-engineering insures fast, easy, low-cost field erection—and also insures 100% re-use of materials for building expansion or removal to a new location.

#### Only BUTLER gives you **ALL** these advantages:

Rigid frame furnishes strength at any point for monorails, hoists or cranes.

- Clear span, rigid frame construction
- Deep-formed corrugated sheets, galvanized or aluminum (alternate wall materials may also be used)
- Bolted construction for extra strength
- Weather-tight die-formed, one-piece roof ridge

- Sidewall sheets mitered for weather-tight fit with eave sheets
- Weather-tight ventilators
- Easily insulated
- Complete adaptability to your door and window requirements



This rigid frame Butler building is insulated and has Butler Lite\*Panel translucent sheets in roof. You can get Butler single span, rigid frame buildings in widths to 70 feet; combination or multiple units in practically any desired width; heights and lengths to meet your requirements.



**MORE SPACE PER DOLLAR**  
Get the complete BUTLER story  
—mail the coupon TODAY!



For prompt reply, address office nearest you:  
**BUTLER MANUFACTURING COMPANY**  
7321 East 13th St., Kansas City 26, Missouri  
921A Sixth Ave., S.E., Minneapolis 14, Minnesota  
Dept. 21A, Richmond, California

- ☐ Send name of my nearest Butler dealer.  
☐ Send information about Butler Steel Buildings  
long x \_\_\_\_\_ wide for use as \_\_\_\_\_

Name \_\_\_\_\_  
Firm \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



**Threads 4 sizes of pipe fast with 1 set  
of dies—and it won't jam!**

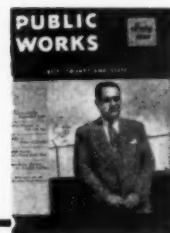
## **RIGGID 65R PIPE THREADER**

This popular 65R has saved millions of hours of threading time, and no wonder—its one set of self-contained high-speed dies adjust to 1", 1¼", 1½" or 2" pipe size in 10 seconds! Mistake-proof self-centering workholder sets instantly! And lead screw won't jam on workholder, kicks out automatically at standard thread length! You can't match it for fast easy pipe threading—buy it at your Supply House.

**THE RIDGE TOOL COMPANY • ELYRIA, OHIO**



It's a fact... our handy Readers' Service card is the way to get new catalogs.



### **LEADERS IN PUBLIC WORKS**



**Peter C. Karalekas**, chief engineer of the Water Works Department of Springfield, Mass., is one of the very fine younger group of engineers. He was graduated in 1934 from the University of Maine with a degree of BS in Civil Engineering; and in 1941 received an MS in Sanitary Engineering from the Harvard Graduate School of Engineering. Prior to the war, he was with the Massachusetts State Department of Health, as a sanitary engineer. Early in the war, he was commissioned in the Sanitary Corps and assigned to the Institute of Inter-American Affairs, with which organization he served very efficiently in Latin America until 1945, reaching the rank of Lt. Col. He now holds this rank in the army reserve organization.

In 1946, after his return from military service, he became chief engineer of the Springfield Water Works, in charge of reservoirs, watershed areas, filtration plants, pipe lines and water works construction. He holds membership in the AWWA, FSIWA, NEWWA, APHA and Massachusetts WWA. He is married and there are four children—three boys and a girl—in the family. He lists his hobbies as golf, sports and stamps—and his golf isn't bad at all. The view on the front page is in front of the aerator at Provin Mt. distribution reservoir, which is about elevation 425, or 355 ft. above Main St., Springfield.

# PLAN NOW TO GET AN Adams TravelLoader

**Loads with equal  
speed and efficiency  
from both windrows  
and stockpiles**



● For high-speed loading, at low cost—from either windrows or stockpiles—you'll find the *All-Purpose* Adams TravelLoader in a class by itself.

On road and street jobs, the TravelLoader picks up and loads surplus windrowed material—dirt, sod, scarified material, snow, etc.—at better than a truck-a-minute clip . . . and does it without interrupting regular flow of traffic.

The TravelLoader handles stockpile loading with equal speed and efficiency, whatever the material—gravel, sand, crushed stone, slag, etc. . . . sends trucks on their way in jig time with full, well-balanced loads.

The TravelLoader's superior performance stems from a host of advanced features, such as **High-Speed, Full-Floating Feeder—Adjustable Conveyor—High, Centrally-Located Cab—Wide Range of Working Speeds.**

Ask your Adams dealer to show you how the TravelLoader will step up production and cut costs on your jobs.

J. D. ADAMS MANUFACTURING CO. • INDIANAPOLIS, IND.



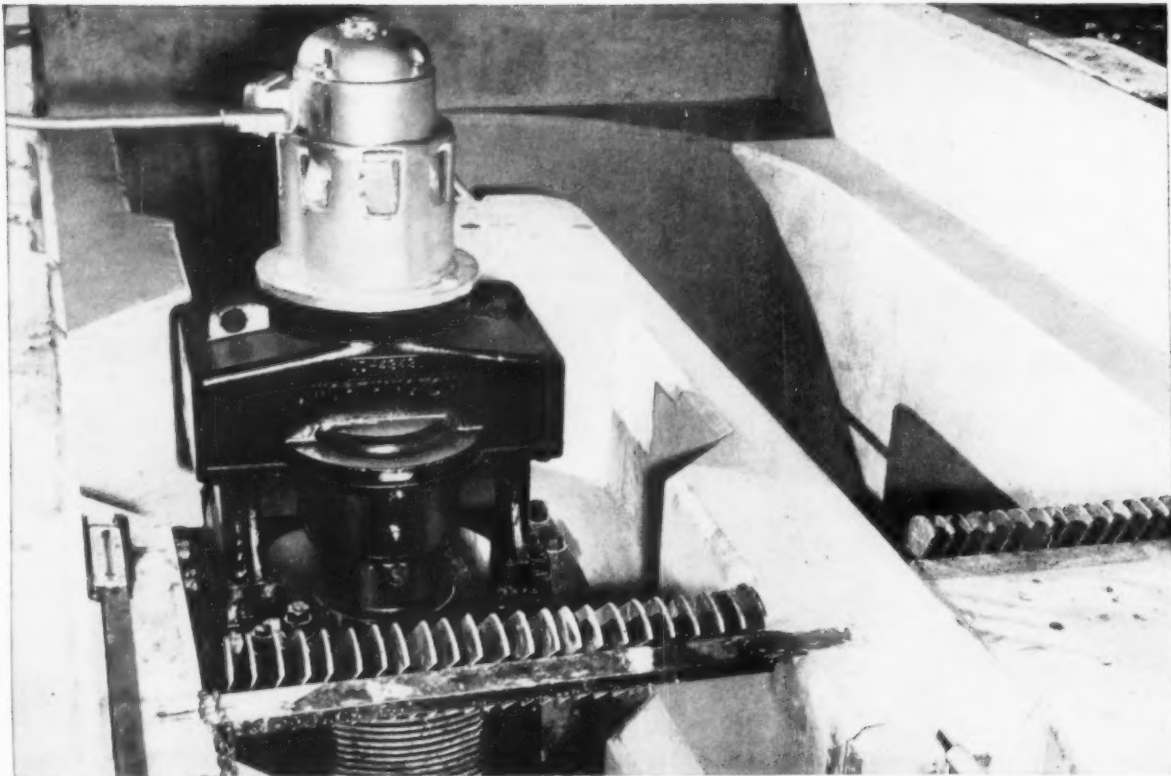
Motor Graders



TravelLoaders



Pull-Type Graders



WORTHINGTON COMMUNITOR IS EASILY INSTALLED TO HANDLE LARGE VARIATIONS IN FLOW like this one at the Madison-Chatham (N. J.) Sewage Treatment Plant. Maximum wet-weather flows are occasionally as high as five times the average design dry-weather flow. An overflow screen is installed on top of the comminutor to screen flows

in excess of the comminutor's capacity. Screenings are later raked down into the comminutor during period of normal flow. The overflow screen makes the comminutor independent of the by-pass on right which may later be used as a channel for a second comminutor. Plant Superintendent is Edward P. Molitor.

## Madison-Chatham, N. J., installation proves adaptability of Worthington COMMUNITOR

Typical example of the adaptability of the Worthington comminutor is the story of this installation at the Madison-Chatham Joint Meeting Sewage Treatment Plant in Chatham, N. J.

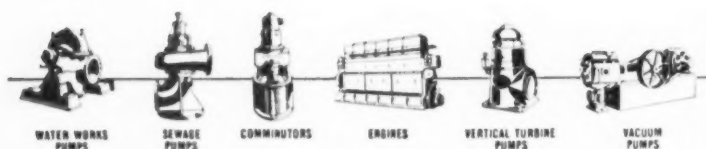
Engineers everywhere especially like the Worthington comminutor because:

- It can be readily installed in new or existing straight-flow rectangular channels.
- Cutter-racks are quickly removable for sharpening or replacement.

- It may be flooded without damage because it's protected by a mercury seal.

Worthington's public works specialists are ready to work with your community's engineer in solving screening problems—as well as other problems in sewage, water works, or municipal power generation. Write for Comminutor Bulletin W-2010-B3. Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Public Works Division, Harrison, N. J.

W.2.5



WATER WORKS PUMPS

SEWAGE PUMPS

COMMUNITORS

ENGINES

VERTICAL TURBINE PUMPS

VACUUM PUMPS

All Major Public Works Equipment Under One Responsibility

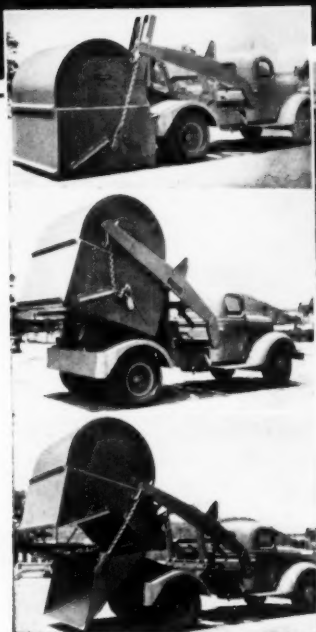
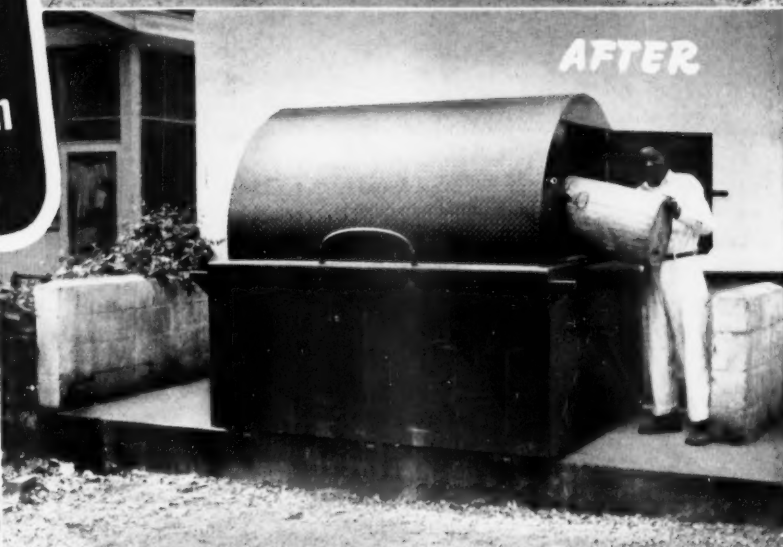
# WORTHINGTON

Public Works Equipment

Need more facts about advertised products? Mail your Reader's Service card now.



Thousands of  
Rat Infested  
Conditions like  
this one are  
being Cured by  
the Dempster-  
Dumpster System

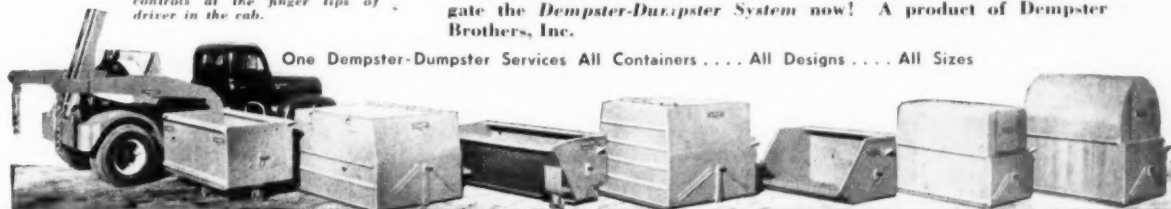


*Dempster-Dumpster is shown above in the three simple stages of picking-up, hauling and dumping a container, completing the cycle in one to two minutes by means of hydraulic controls at the finger tips of driver in the cab.*

In this case, a Lexington, Ky. groceryman had done all he could within reason to make the most sanitary condition possible with conventional cans, including the added expense of an attractive concrete platform. Yet, look at the difference after a 10 cu. yd. Dempster-Dumpster Detachable Container replaced the cans, crates, barrels, etc. Multiply this case many times to include other stores, hospitals, schools, market, apartment and housing areas. Then, you can see how your city, too, can eliminate rat infested, unsanitary bulk rubbish handling with the Dempster-Dumpster System.

On schedule, one truck-mounted Dempster-Dumpster, with only one man, the driver, handles scores of containers, one after another. This system eliminates loading crews because there is no re-handling of trash. In addition, one truck-mounted Dempster-Dumpster does the work of 3 to 5 conventional trucks, reducing truck investment and operation costs. Without question, the Dempster-Dumpster System is the lowest cost method ever devised for bulk rubbish collection! Investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

One Dempster-Dumpster Services All Containers . . . All Designs . . . All Sizes



**DEMPSTER BROTHERS, 973 Dempster Bldg., Knoxville 17, Tennessee**

Get full details of this month's new products . . . mail your Readers' Service card today.

# FREE

## EQUIPMENT DATA to Help Your PUBLIC WORKS PROGRAM

### Investigate "Monotubes" For Modern Street Lighting

76. Monotube street lighting poles are offered in modern design for use with either incandescent or fluorescent luminaires on all street and highway lighting applications. For helpful information on these attractive and economical poles write to Union Metal Mfg. Co., Canton 5, Ohio, or check the coupon.

### Theory of Controlled Digestion With Floating Cover Tanks

88. In an excellent 40-page booklet, an authoritative discussion of digestion theory and practices, including design, operation and economics is presented by the Pacific Flush Tank Co., Chicago 11, Ill. Complete data are given on the use of floating covers, together with details on tank construction, piping and control chambers. Requests for this valuable booklet must be made on business letterhead.

### Design Data on Chemical Flocculating Equipment

89. Flash mixers, straightline mixers, conveyors and elevators for handling chemicals are described in an illustrated bulletin now available from Link-Belt Co., Colmar, Pa. Selection tables and diagrams are provided to help you select the equipment best suited to your needs. Check the coupon for your copy.

### Methods of Chlorinator Control

98. Chlorinator control methods include manual, semi-automatic, program, rate, fully automatic proportional and split feed control. To assist the chlorinator user and his engineer or technical adviser in the selection of the control method best suited for each requirement, a publication of Wallace & Tiernan, Inc., describes these methods in detail. You can get a copy of Publication TA-1013-C by checking the coupon.

### Engineering Data On Gravity Filter Design

170. The complete line of gravity filters and related accessories furnished by the Permutit Co., New York 36, N. Y., is covered in a well-illustrated 24-page booklet. Each element of a filter and filter controls are discussed in detail to assist the designer of these important units. Get your copy of this helpful publication by checking the coupon.

The engineering information in these helpful catalogs will aid you in your Engineering and Public Works programs. Just circle numbers you want on the coupon, sign and mail. This free Readers' Service is restricted to those actively engaged in the public works field.

### Dozer-Loader Combinations Increase Tractor Output

46. Details on dozer-loaders of 3, 4 and 5-d. capacities which feature easy mounting on crawler tractors are presented in an illustrated bulletin by Teale & Co., Box 308, Omaha, Nebr. Investigate the Teale dozer-loader now. Just check the coupon.

### Useful Design Data On Clarifiers



### What You Should Know About Air-Placed Concrete

67. For a detailed explanation of the principle of "gunned" or "air placed" concrete and description of the improved Model 750 and 1250 Bondactors, be sure to get your copy of Form 553 from Air Placement Equipment Co., 1011 W. 24th St., Kansas City 8, Mo. Check the coupon today.

### Technical Supplement Describes Mixing, Coagulation and Flocculation

75. A new Technical Supplement issued by American Well Works, Aurora, Ill., provides full engineering data on slow mix equipment for chemical mixing, coagulation and flocculation. Design details, specifications and useful general data are included. Check the coupon for your copy.

### How to Separate Solids From Industrial Wastes

111. Removal of solids from waste liquids is described in an illustrated booklet on the Sween Separator, product of the Southwestern Engineering Co., 4800 Santa Fe Ave., Los Angeles 58, Calif. Methods of operation, engineering details and case histories are included in this booklet. Get a copy now by checking the coupon.

### How Engineers and Contractors Can Get This Comprehensive Water Control Apparatus Catalog

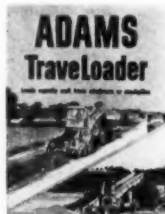
141. A 250-page catalog showing the full scope of Rodney Hunt water control apparatus is now available for distribution to consulting engineers, contractors and others actively engaged in water control construction work. Hundreds of diagrams, detailed descriptions and specifications show all types of sluice gates and related items, and a special section provides helpful engineering data. Send your request on business letterhead or use the coupon, stating your occupation. Rodney Hunt Machine Co., 7 Water St., Orange, Mass.

### Get This Helpful Data On Valve Boxes

187. Full details on service, roadway and valve boxes, meter boxes, frames and covers are included in Bulletin 2000 issued by Alabama Pipe Co., Anniston, Ala. All standard sizes are listed, together with prices, and instructions are furnished for handling special designs. Check the coupon for your free copy.

### All-Purpose TravelLoader For Windrows and Stockpiles

59. The versatile TravelLoader, product of J. D. Adams Mfg. Co., Indianapolis, Ind., is fully described and illustrated in a new 8-page catalog. Action pictures show how you can do quick and efficient materials handling on ditch cleaning, road reclamation, snow loading and other windrow and stockpile loading jobs. Check the handy coupon.



### Traffic Control Signs That Defy Destruction

204. Durasigns, reinforced with fiberglass, offer unusual resistance to weather, corrosion and abuse, and you save two ways since the first cost is low and Durasigns never need painting. Available in standard sizes, regular or reflectorized surface. Get full data by checking the coupon or write Durasign Div., Nufone Co., Inc., Dept. W, Erie, Pa.

### Finding Buried Pipe the Modern Way

219. Precise location of buried pipe is easy with the Featherweight Goldak Pipe Locator. For the full story of pipe locators and their use, write the Goldak Co., 1545 W. Glenoaks Blvd., Glendale, Calif., or check the handy coupon.

7-53

### USE THIS COUPON to get detailed information

on products and materials mentioned in this issue. Circle numbers below and mail today.



#### Booklets from pages 28 to 48:

20 21 25 26 27 28 30 32 33 35 38  
39 41 44 46 49 52 59 60 65 66 67  
68 69 75 76 81 82 84 86 88 89 91  
96 97 98 100 102 106 107 108 110 111 114  
115 116 117 122 123 124 129 130 132 135 136  
138 139 140 141 142 143 148 150 154 156 158  
162 166 167 168 170 175 177 180 182 185 187

188 191 193 195 197 198 204 208 219 222 227  
230 232 234 235 236 246 247 255 258 261 264  
266 269 271 272 273 275 278 281 283 285 290  
292 296 297 298 299 304 305 312 315

#### New Products, pages 115 to 119:

7-1 7-2 7-3 7-4 7-5 7-6 7-7 7-8 7-9 7-10  
7-11 7-12 7-13 7-14 7-15 7-16 7-17 7-18 7-19

Name .....

Occupation .....

Street .....

City ..... State .....

NOT GOOD AFTER AUGUST 31, 1953

MAIL THIS CARD NOW



**Tandem  
Rollers**

*with 22 Great Features*

**HUBER**

8-12 TON • 10-14 TON

Here's a new HUBER Tandem Roller that offers new standards of performance in terms of speed, dependability, smooth operation and long life.

Make up a check list of every feature you'd like to see in a tandem roller—and see for yourself how HUBER has anticipated your needs. More than a score of major and minor refinements are incorporated in its design and construction.

Such features as permanent bearing alignment in the kingpin and swivel pin assemblies, the wrap-around frame that gives you a new concept of rigidity, and HUBER's perfected version of fluid coupling are among the improvements that will catch your interest.

The best way to get the whole story is to see one of the new HUBER tandems in action. Second best is to write for a copy of the new HUBER TANDEM ROLLER BULLETIN, No. T-152. Send for your copy today, or see your nearest HUBER Distributor.



This 16-page bulletin, T-152, tells the story of the new HUBER Tandem Rollers in pictures and descriptive copy. Ask for your copy—address requests to Huber Manufacturing Co., Marion, Ohio.

**HUBER MANUFACTURING CO. • Marion, Ohio, U. S. A.**  
Manufacturers of Huber Maintainers, Graders and Complete Line of Rollers



To order these helpful booklets check the coupon on page 28.

### New Catalog Describes Fluorescent Street Lighting

180. Latest developments in fluorescent street lighting are described in an 8-page bulletin from General Electric Co., Schenectady, N. Y. Advantages, applications, electrical and photometric data on fluorescent luminaires are presented. Get Bulletin GEC-963 by checking the handy coupon.

### Construction Methods for Salt Stabilized Roads

66. A comprehensive booklet showing modern methods of salt stabilization is now available from the Morton Salt Co., 120 So. LaSalle St., Chicago 3, Ill. Stabilized secondary roads, base courses and shoulders are discussed, and all equipment and construction methods are covered. Just check the coupon.

### Timber Bridges For Performance and Economy

140. Pertinent engineering information on modern timber bridges is contained in an attractive 8-page catalog issued by Timber Structures, Inc., Box 3782, Portland 8, Oregon. Standard bridges including deck arch, girder, bowstring truss, trestle and complete deck types are illustrated with photographs and schematic drawings. Copies may be obtained by checking the coupon.

### What Metallizing Can Do For You

167. The metallizing technique affords many opportunities for great savings by building up worn pump shafts and wearing rings, applying corrosion-resistant materials and avoiding costly replacements. Learn how your shop can handle these maintenance problems. Check the coupon for catalog of the Metallizing Co. of America, 3520 W. Carroll, Chicago 24, Ill.

### The Surveyor's Notebook

195. Series Two of the popular Surveyor's Notebook is now available from W. & L. E. Gurley, Troy, N. Y. This collection of short articles relating to actual field problems and their solutions includes many helpful surveying tips told in the surveyors' own words. Check the coupon for your free copy.

## SIGNS AND TRAFFIC CONTROL

### New Reflectorized Sign Faces Refurbish Old Traffic Signs

292. Get complete details on new "EZ-On" traffic signs faces ready for immediate shipments. Reflectorized faces cost only a fraction as much as new signs and are easily attached to existing traffic signs. Use the coupon for data today. Grace Sign & Mfg. Co., St. Louis 18, Mo.

## CONSTRUCTION EQUIPMENT AND MATERIALS

### 1,001 Profitable Uses For Holmes-Owen Loader

39. The addition of a Holmes-Owen Loader to your dump truck converts it into a complete digging and loading unit that enables one man to load, haul and dump. Illustrated folder shows how this self-loading unit with hydraulic crowding action can be a real time and labor saver for the municipality or contractor. Check the handy coupon for full data. Ernest Holmes Co., Chattanooga, Tenn.

Over one hundred items are listed here and in the New Equipment section. Order what you need today. Just check the coupon.

### Booklet Helps Design of Custom-Engineered Steel Buildings

110. Custom-engineered Butler steel buildings are available in every size type and design to meet your building needs. In a helpful 32-page booklet you will find details on several basic designs and an unlimited variety of door, window and interior treatments; answers to your questions on construction and erection; and many illustrations of typical uses. Use the coupon or write to Butler Mfg. Co., Kansas City, Mo.

### Helpful booklet on Carryable Centrifugal Pumps

122. A booklet prepared to give practical information that will guide you in choosing the best type of pump for your requirements is offered by the Homelite Corp. Both gasoline and electric models are discussed, and requirements outlined for many applications. Just check the coupon for your copy. The Homelite Corp., 2125 Riverdale Ave., Port Chester, N. Y.

### Three-Wheel Roller For General Purpose Duty

142. A 20-page bulletin describing general purpose 3-wheel rollers covers 8, 10, 12 and 14-ton gasoline and diesel models of the Huber line. Illustrations and comprehensive explanation show component parts of the rollers and describe the general duties of the units. For your copy of this attractive bulletin, No. H-150, write the Huber Mfg. Co., Marion, Ohio, or use the coupon.

### Not Sure You Need A Hydrocrane? Just See What One Can Do!

185. In one of the most appealing bulletins we have seen there are over 100 illustrations showing the versatile, all-hydraulic Hydrocrane performing dozens of different jobs. You could keep one busy with digging, trenching, backfilling, cleaning catch basins, loading and unloading, hoisting and erecting, materials handling, placing pipe, and on many other applications. For the full story of this mobile, truck-mounted machine just check the coupon today. Bucyrus-Erie Co., South Milwaukee, Wis.

**NEW IMPROVEMENTS**  
Cable Drum Clutch  
Upper Arch Sheave  
Automatic Cable  
Level Wind

## OK CHAMPION Power Sewer Cleaner

Twin rigs take debris from sewer to street in one operation.

Mounted on four wheel trucks—safer—eliminates lifting over or pulling away from manholes—safer tandem towing.

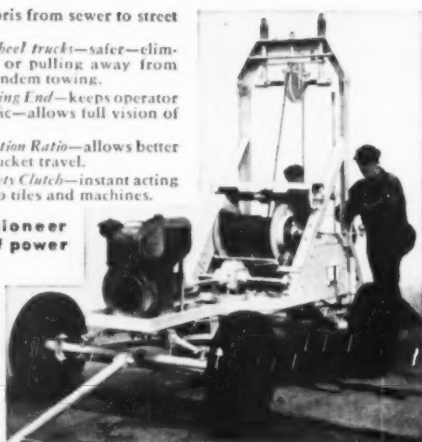
All Controls at Working End—keeps operator out of passing traffic—allows full vision of work.

Built-in Gear Reduction Ratio—allows better use of power for bucket travel.

Fully Automatic Safety Clutch—instant acting—avoids damage to tiles and machines.

Rely on the pioneer  
manufacturer of power  
sewer cleaners.

**CHAMPION  
CORPORATION**  
Hammond,  
Indiana



### SEND FOR LITERATURE

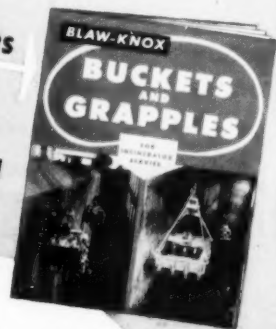
Champion Corporation, 4752 Sheffield Ave., Hammond, Indiana  
Please send information on new OK Champion Power Sewer Cleaners.

Name.....Title.....

Address.....

For  
**MODERN INCINERATORS**

Here is the  
information that  
every Municipal and  
Designing Engineer  
needs



WHAT clearances (headroom) should you specify for tine type grapples or buckets?

Do you make proper allowance for the refuse that hangs below the bottom of the bucket?

Bulletin 2350 answers these questions with complete information and illustrations. Also included is a typical bucket and tine type grapple specification for your guidance.

SEND FOR BULLETIN 2350 TODAY

**BLAW-KNOX COMPANY**

Blaw-Knox Equipment Division

2124 Farmers Bank Bldg. Pittsburgh 22, Pa.  
Offices in principal cities.

**BLAW-KNOX** INCINERATOR  
BUCKETS



# add it up!

Dependability. Durability. Fuel and lube oil economy. Low-cost maintenance. Prompt, effective factory service.

Add it up and you'll see why Fairbanks-Morse Diesel and Dual Fuel engines give you more power... more water... more production at lower *total* cost. Fairbanks, Morse & Co., Chicago 5, Illinois.

**FAIRBANKS-MORSE DIESEL POWER IS YOUR BEST POWER BUY**

**for power generation**



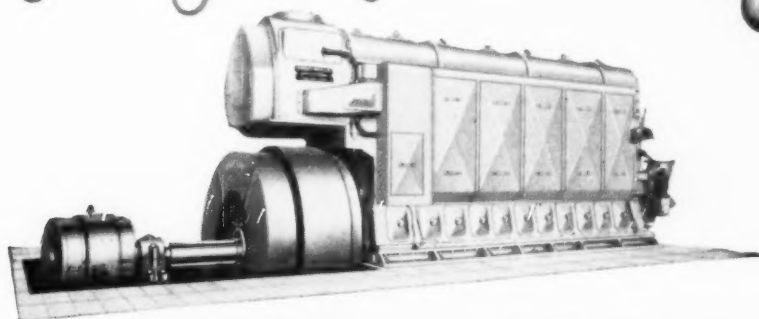
**for water pumping**



**for sewage plants**



*...for your plant*



## **FAIRBANKS-MORSE**

*a name worth remembering when you want the best*

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY  
PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

Thousands use our Readers' Service card to keep up to date... do you?

To order these helpful booklets check the coupon on page 28.

### Gunite Costs Less On Repair Jobs

255. Be sure to investigate Gunite for repair of reservoirs, dams, water and sewage plant tanks, sewers, swimming pools, etc. Contact Eastern Gunite Co., Elkins Park, Pa. for full information, or use coupon.

### Blades For All Types Of Equipment

40. Get information now on long-wearing blades for graders, scrapers, bulldozers, snow plows and scoops; snow plow noses and runners; scarifier teeth and numerous other products for road machinery. Check coupon or write to Paper-Calmenson & Co., St. Paul 8, Minn.

### Check Your Power Needs Without Delay

68. International Harvester Company has available a folder describing its line of diesel engines and power units for all your power needs up to 180 hp. For a copy of this colorful booklet, write to International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill., and ask for form A-156-NN, or use the handy coupon and we will forward your request.

### A "Quick-Way" Truck Shovel Will Handle Your Job

82. Four models of "Quick-Way" truck shovels,  $\frac{1}{2}$  to  $\frac{3}{4}$  yd. capacity, and trench hoe, backhoe, crane, shovel, clamshell, pile driver or dragline attachments are ready to handle most every type of public works project. Get complete details by checking the coupon or write to "Quick-Way" Truck Shovel Co., Box 1800, Denver 1, Colo.

### Grading Can Be Faster, Cheaper and Easier

96. You'll like every feature of the Austin-Western 9911 Grader. It has all-wheel drive, all-wheel steer, controlled traction, precision sideshift and a high lift, extreme reach, reversible blade. Get data from Austin-Western Co., Aurora, Ill.

### Handbook of Contractors Pumps Is Easy to Use

49. Big 50-page Catalog P-10 covers de-watering pumps, pressure pumps, well point systems and electric pumps, and also features a special section of useful data which helps in the selection of the right pump for your job. Every construction engineer and contractor should have a copy of this valuable handbook. Just check the coupon. The Jaeger Machine Co., 400 Dublin Ave., Columbus 16, Ohio.

### Inexpensive Ditcher Handles Heavy Digging

91. The Shawnee Scout Ditcher, a new, heavier model for extensive digging has been added to the Shawnee line of ditchers and dozers. All models are designed to handle ditching and backfilling operations quickly, efficiently and at low cost. Full information on this equipment will be sent by Shawnee Mfg. Co., 1947 N. Topeka, Topeka, Kansas. Just check the coupon.

### "Encyclopedia" on Bulldozers

97. Every size and style of bulldozer made by Caterpillar Tractor Co., Peoria 8, Ill. is shown in a 36-page booklet, Form 30461. Cutaway views showing details, important components of hydraulic and cable controls, attachments such as brush, root and rock rakes, treedozers and stumpers are also included. Get this interesting publication by checking the coupon.

### Profitable Construction with Payloaders

234. A comprehensive, 12-page catalog filled with on-the-job photos showing a wide variety of earth-moving, material-handling, lifting and carrying jobs being performed by the multi-purpose tractor-shovels known as "Payloaders" is now available. Helpful job data, specifications and features of the complete Payloader line are included, with illustrations of useful accessories. Copies of this colorful catalog No. 217 can be obtained from The Frank G. Hough Co., 761 Sunnyside Ave., Libertyville, Ill., or by checking the coupon.

### How to Get Better Concrete Construction

198. A comprehensive report on the use of "Pozzolith" as a means of increasing the strength and durability and reducing the permeability of concrete structures, while reducing costs at the same time, is presented in 32-page Bulletin LH 9-52 of Master Builders Co., Cleveland 3, Ohio. Every engineer and contractor should study this helpful data. Check coupon for your copy.

### Details on Motor Grader Construction and Use

312. In a handsome catalog, profusely illustrated with diagrams and photographs of unusually fine quality, the Galion Iron Works and Mfg. Co., Galion, Ohio, has presented all details on the construction and operating features of their Model 118 motor grader. This impressive 28-page catalog, No. 375, is available without charge. Just check the coupon.

### Trencher Fits Municipal Needs

315. A bulletin describing the Cleveland Model 95 trencher has been published by the Cleveland Trencher Co., Cleveland 17, Ohio. The Model 95, called "The standard machine for city and suburban work", is versatile, maneuverable and economical for use on water lines, service lines, road widening and all utilities trenching. Get this 8-page illustrated bulletin by checking the coupon.

## CIVIL DEFENSE

### Get the Facts on Air Raid Sirens

86. There's more to be considered in air raid warning sirens than the loudness of the signal. Get complete information on efficient size and spacing of sirens from Federal Enterprises, Inc., 8733 So. State St., Chicago, Ill., by using coupon.

Low cost, pure filtered water, for small and medium size municipal water works now possible with a —

## SPARKLER Model SCJ Self cleaning water filter

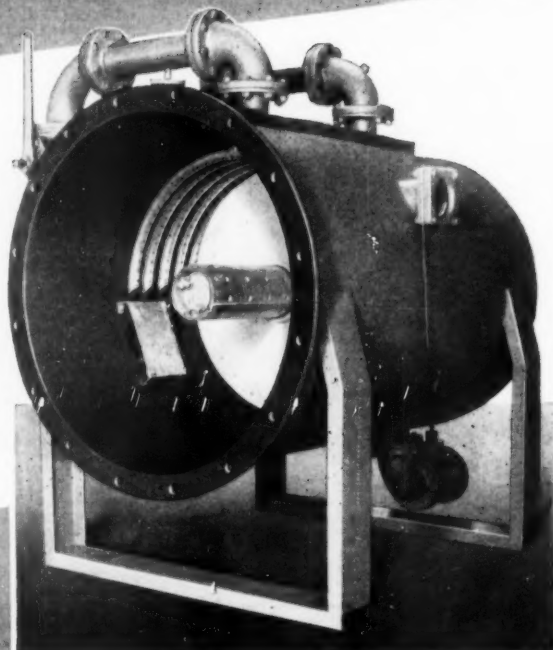
The model SCJ filter is a diatomite slurry feed filter designed to produce the highest quality pure water at a maintenance cost much lower than usually can be attained with older type filters.

This filter can be cleaned in two to five minutes either by flushing off with the built-in jet spray or by backwashing or a combination of both. The filter media is usually a synthetic cloth such as orlon which pre-coats quickly and washes clean rapidly.

A high efficiency diatomite slurry feeder, which operates in conjunction with the SCJ Sparkler Filter, adds greatly to the length of cycle between cleanings... resulting in lower operating costs. Operators can be easily trained... no highly skilled specialized personnel required. Floor space occupied by the SCJ is relatively small for the extremely large volumes handled. Single units are available in sizes to handle up to 96,000 G.P.H. ... or over 1,000,000 gallons per day. And... this is important... the largest unit uses less than 1000 gallons of water to clean the filter.

Write for plans and prices on your requirements.  
Personal engineering service on all installations.

SPARKLER MANUFACTURING CO. MUNCIELIN, ILL.



Pacal

**BLADES***are extra long lasting when bolted with***Pacal Heat Treated  
PLOW BOLTS**

Wear and breakage due to vibration and shock are reduced when grader, scraper, bulldozer and snow plow blades are installed with Pacal Heat Treated Plow Bolts. Pacal Bolts are high tensile bolts having more than double strength. They fit tighter and will not stretch or loosen. The slightly higher original cost is compensated because Pacal Heat Treated Bolts can be re-used oftener and blades will last longer because of the tighter fit.

**ALL LENGTHS CARRIED IN STOCK  
FOR IMMEDIATE DELIVERY***Diameters: 1/2", 5/8", 3/4", 7/8" and 1"*

No. 3 Head (Round Countersunk Head, Square Neck) heat treated to Society of Automotive Engineers Grade 5 Specifications. Furnished with A.S.R. Hexagon Nuts.

*Use Pacal Bolts on Pacal Blades for Graders, Scrapers, Bulldozers and Snow Plows.*

**Write, wire, or phone Dept. BD-73**

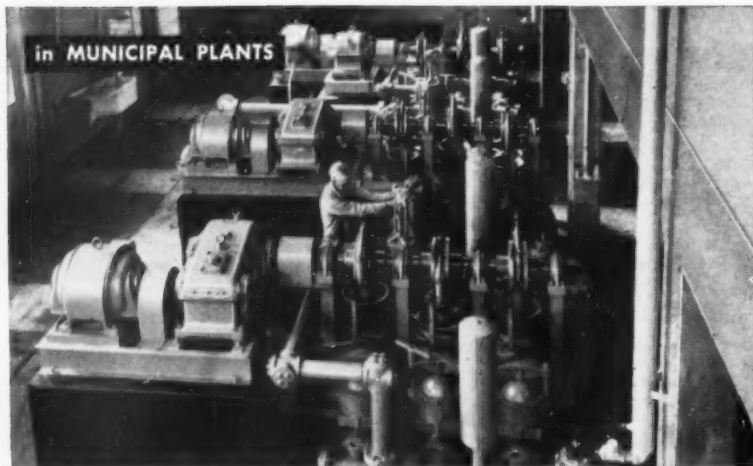
**PAPER-CALMENSEN & COMPANY**

COUNTY ROAD B AND WALNUT STREET • ADJOINING HIGHWAY 36

TELEPHONE NESTOR 9456 • ST. PAUL 8, MINN.

Now's the time to mail this month's Readers' Service card.

To order these helpful booklets check the coupon on page 28.



## MARLOW PLUNGER PUMPS

### *Engineered for **TOUGH JOBS***

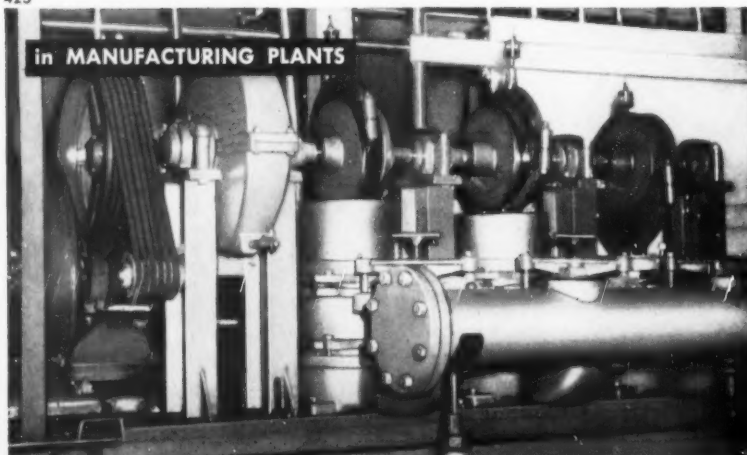
You can rely on rugged, heavy-duty Marlow Plunger Pumps for economical, dependable, and efficient handling of municipal and industrial wastes.

These high-performance pumps are suitable for pumping raw and digested sewage sludges, chemical wastes and slurries, settled oil solids, distillation mashies, sugar bagasse, meat packing and cannery wastes and similar waste materials.

Marlow Plunger Pumps are available with one, two, three, or four plungers in 7, 9, or 11-inch diameters. Capacities range up to 500 GPM with pressures up to 100 PSI.

For complete information on how to solve your municipal or industrial waste disposal problems, see your Marlow dealer or write for bulletin W-52.

425



## MARLOW PUMPS

Other factories in France and England

RIDGEWOOD, NEW JERSEY

Branch Plants: DeQueen, Arkansas  
West Chicago, Illinois

Distributors and Dealers everywhere

## SEWERAGE AND WASTE TREATMENT

### What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, c/o Editor, Public Works, 310 E. 45th St., New York 17, N. Y. Check the coupon and we will forward your request.

### Valuable Booklet on Porous Diffuser Plates and Tubes

21. A helpful 20-page booklet published by the Norton Co. is a complete guide for the selection of porous media for installation in activated sludge plants. Full data for the designing engineer is provided by careful detailing of physical characteristics of plates and tubes. Maintenance of porous media also is discussed at some length. For your copy of Form 1246, write the Norton Co., Dept. PW, Worcester 6, Mass., or use the coupon.

### How Cities Clean Sewer Lines From Street in One Operation

25. In a helpful 28-page handbook of sewer cleaning methods and equipment the makers of OK Champion sewer cleaners give full details of power and hand operated models. Also included are data on expansion buckets that take dirt from sewer to street in one operation, root cutters and other accessories. Get your copy by checking coupon. Champion Corp., 4752 Sheffield Ave., Hammond, Ind.

### A Handbook of Sewer Cleaning Methods and Materials

44. Complete, easy-to-follow directions for every type of sewer cleaning operations and the equipment needed for effective cleaning work is covered in a 40-page booklet issued by Flexible Sewer-Rod Equipment Co., 9059 Venice Blvd., Los Angeles 34, Calif. Full details are provided on power cleaning machines, the SeweKoder, hand tools and all accessories. Water main and culvert cleaning methods are included. Check the coupon for your copy of this helpful handbook.

### Helpful Design Data For Sewage Ejectors

81. The applications and advantages of pneumatic sewage ejectors are outlined in a new bulletin of the Blackburn Smith Mfg. Co., Inc., Hoboken, N. J. Included are piping diagrams for electrode and float switch controls plus dimensions and layouts for single and duplex systems. Get your copy by checking coupon.

### Useful Data on Butterfly Valves

100. Complete descriptions and tables of dimensions on the full line of Rockwell Butterfly Valves is contained in several bulletins published by the company. Construction details and special control features are illustrated. Write W. S. Rockwell Co., 200 Eliot Street, Fairfield, Conn.

### End Root Problems With Root-Proof Sewers

107. Troubles caused by roots and corrosion in house connections can be eliminated by the use of root-proof Bernico sewer pipe. Full details on this smooth, waterproof, tight-sealing pipe available by checking the coupon, or write to the Brown Co., Dept. PW, 150 Causeway St., Boston 14, Mass.

### What You Should Know About Design and Use of Concrete Sewers

122. Every engineer and contractor should have a copy of the 48-page book "Concrete Sewers" in his library. This valuable text, published by the Portland Cement Assn., 33 W. Grand Ave., Chicago 33, Ill., gives an authoritative discussion of hydraulics, sewer design, construction and maintenance. Generous use of helpful illustrations makes the book attractive and helpful to the reader. For your copy, just check the handy coupon.



# Reduce your SWEEPING COSTS

WITH **M O B I L - S W E E P E R**



## GET Top Performance AT LOWER COST!

Discover new ways to save money on street sweeping, airport sweeping, and highway sanitation with the big Mobil-Sweeper. Savings of 45% over all previous methods of street sanitation are being reported by Mobil-Sweeper users. Learn more about what communities across the Nation report on actual experiences with this fine sweeper. Many communities say maintenance and upkeep costs are the lowest on record. Manpower requirements are lower too.

Mobil-Sweeper can change street sanitation into a one-man job. Traveling to-and-from the dump at top traffic

speeds, Mobil-Sweeper eliminates need for a truck and pick-up crew to follow. Where central dumping is used, Mobil-Sweeper's big hopper capacity makes it a top performer in this system.

You can't overlook safety—a covered cab with shatter-proof windshield gives protection to your operator . . . places him in a position for better visibility—as attested by leading automotive engineers. Four wheel hydraulic brakes are a must on heavily loaded vehicles—Mobil-Sweeper has them.



*Write for  
literature today!*

# MOBIL-SWEEPER

DIVISION OF THE CONVEYOR CO.

3260 E. Slauson Ave. • Los Angeles 58, Calif.

Thousands use our Readers' Service card to keep up to date . . . do you?

### Design Data for the Spiraflo Clarifier

124. Be sure to investigate the advantages of the Spiraflo clarifier for sewage treatment. Full engineering data, description of the unit, test results and specifications are offered in 24-page Bulletin 122 by Lakeside Engineering Corp., 222 W. Adams St., Chicago, Ill. Check the coupon today.

### Low Cost Power From Dual Fuel Engines

154. Operating on the Diesel cycle, burning either oil or gas, the Worthington Super-charged Dual Fuel Diesels give high economies by running on the cheapest fuel available. Get complete data from Worthington Corp., Dept. P.W. Harrison, N. J.

### Technical Data Offered on The "Barminutor"

156. The Chicago Pump "Barminutor" which combines a bar screen with a vertically traveling Comminutor unit is now available for flows of 15 MGD and over. Units are readily installed in existing open channels. Get full technical data from the Chicago Pump Co., 622 Diversy Pkwy, Chicago 14, Ill.

### Helpful Data on Sluice Gates

158. In a well-organized 48-page catalog you will find complete engineering and design data on Pekrul sluice gates, headgates, automatic flap gates, lifts and accessories. Numerous models in 6" to 92" sizes are available, and all pertinent data will be found in this helpful booklet. Write Morse Bros. Machinery Co., Denver, Colo., or use the coupon.

### Non-Clogging Vertical Wet-Pit Pump Described

182. Full engineering data on Worthington "Freedlo" wet-pit pumps with non-clogging impellers capable of passing solids and stringy material are included in Bulletin W-317-B12. Check these pumps for sump, sewage and drainage service. Bulletin available from Worthington Corp., Harrison, N. J. Just use the coupon.

### Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

191. The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 52-page Catalog 833. Detailed information is provided on bar screens, grinders, grit collectors, "Tigris" washers, sludge collectors, feeders, conveyors and other related units. Photos and drawings of installations plus capacity tables complete this valuable booklet. Use coupon or write Jeffrey Mfg. Co., 947 N. 4th St., Columbus 16, Ohio.

### Porous Media Handbook For Sanitary Engineers

222. A really helpful 56-page booklet just published by the Carborundum Company tells the complete story of the use of porous media in the fields of water and sewage treatment. The major portions are devoted to water filtration and air diffusion for activated sludge treatment. Diagrams show the many installation methods used, and full data is provided for the designing engineer. General data and specification sections complete this valuable reference bulletin. Get Form 5118 by checking coupon or write The Carborundum Co., Refractories Div., Perth Amboy, N. J.

### Efficient Blowers for Activated Sludge Plants

232. Many advantages of Roots-Connersville positive displacement rotary blowers are described in Bulletin 22-23-B-13, which also provides characteristic curves for operation with constant speed, multi-speed and variable speed motors and details of several types of blowers. Get this helpful bulletin by checking the coupon. Roots-Connersville Blower Corp., Connersville, Ind.

### How to Dispose of Sewage and Industrial Sludges

281. Get full information on the C. E. Raymond System of combined incineration and sludge drying providing high temperature deodorizing for nuisance-free sludge disposal. Flexible layouts fit large and small communities. Use handy coupon or write Combustion Engineering Inc., Flash Dryer Div., 200 Madison Ave., New York 16, N. Y.

### Design Data for Insulated Piping

188. For all jobs where insulated piping is required you will want full design data on Ric-wil Prefabricated Insulated Piping. Get 28-page catalog from the Ric-wil Co., Cleveland, Ohio, for details on both underground and overhead lines.

### Complete Data On Sludge Pumps

193. Sludge pumps, simplex, duplex, triplex and quadruplex, normal and heavy duty models, are described in Bulletin S48 issued by Marlow Pumps, Ridgewood, N. J. Check the handy coupon for your free copy.

### General Catalog on Measuring and Controlling Equipment

272. The full line of Simplex equipment for the measurement and control of liquids and gases in water and sewage plant installations is illustrated and described in detail in 28-page Catalog 003. Every engineer should study the design data in this helpful booklet. Write Simplex Valve & Meter Co., 68th & Uplands Sts., Philadelphia 42, Pa., or use the coupon.

### Reference Book on Lubricated Plug Valves

273. Lubricated plug valves, including stick-proof lever sealed valves for easy operation and positive mechanical seal are fully described in reference books issued by Homestead Valve Mfg. Co., Box 550, Corapolis, Pa. Check the coupon for your copy.

### Instrumentation and Control Equipment For Water and Sewage Plants

298. Full engineering data on the instrumentation and control equipment needed in water works, sewage plants, pumping station and related installations are provided in the "Application Engineering Data" binder issued by the Foxboro Co., Foxboro, Mass. Every engineer and designer should have this valuable material on hand. Check the coupon if you can use this data.

Note  
What  
Carl Bauer says...  
County Engineer  
County of Montgomery  
Dayton, Ohio



"With the ever increasing traffic on our highways, we find that by using "EZ-ON" GRACE Signs, we now have a low-cost way to greater highway safety. We recommend them very highly..."  
Carl D. Bauer

## GRACE "EZ-ON" FACES QUALITY TRAFFIC SIGNS! AT 1/2 THE ORDINARY PRICE!

Order GRACE "EZ-ON" Faces to renew your unsightly or defaced traffic signs. They slip on over your present signs. Old sign is thus never out of service, yet is as good as new... and at ONE HALF the cost! GRACE "EZ-ON" Faces are made of 30 gauge steel with flanges that crimp over old signs. They attach in less than 5 minutes!

### STANDARD WARNING AND REGULATORY COPY...2 SIZES...2 SHAPES

GRACE "EZ-ON" Faces are made in diamond and octagon shapes, with any standard copy, 24-in. and 30-in. size.

### THEY'RE PROVEN IN SERVICE

"EZ-ON" Faces withstood equivalent of 3 years outdoor exposure in Weatherometer tests for color retention and head adhesion. Reflective qualities approved by State Highway Departments.



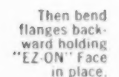
### REFLECTORIZED SIGNS

...at a new low price! "EZ-ON" Sign Faces meet all standard tests, and are now yours at 1/2 the cost of new traffic signs! Our highly specialized production procedure makes this possible.

### SO EASY TO ATTACH



You slip "EZ-ON" Face over old sign. NOTE WIDE FLANGES.



Then bend flanges backward holding "EZ-ON" Face in place.



Use special crimping tool to clamp flanges and secure sign.

### IT'S THAT EASY!

WRITE TODAY  
FOR COMPLETE  
DETAILS

**GRACE SIGN  
and MANUFACTURING CO.**  
ST. LOUIS 18, MO.

► immediate shipment to meet your needs... ►



## Garbage collection in your city can be SO SIMPLE... SO ECONOMICAL!

LOOK at all the Heil Colecto-Pak features that mean sanitary, easy, low-cost collection of garbage and refuse. See how you can solve your garbage collection problems *simply and economically*.

- Colecto-Pak's totally enclosed, water-tight body keeps everything out of sight and smell. Body capacity—10 cu. yds.
- Low loading height makes it easy for your crews to handle refuse and garbage without exertion or spilling.
- Hydraulically operated packer plate compresses material to eliminate waste space and accumulate bigger load. This means fewer trips to the dump.
- Simple Heil Hydraulic operating system insures smooth, silent, long-life performance with a minimum of maintenance. No skilled labor required to operate.
- Quick, clean final discharge of load is assured by tapered body construction and Heil Twin-Arm Hoist.

These are only a few of the many Colecto-Pak features it will pay you to investigate. Next time you buy, be sure to specify Colecto-Pak. Write for further details.



Cut-away view showing bucket dumping and packer plate in open position. As bucket lowers, packer plate compresses load.



Cut-away view shows packer plate in closed position. Material is being compressed toward rear of body to eliminate waste space.

GB 1

## THE HEIL CO.

Dept. 4473, 3044 West Montana Street • Milwaukee 1, Wisconsin

Factories: Milwaukee, Wis. — Hillside, N. J.

Sales Offices: Union, N. J., Washington, D. C., Atlanta, Cleveland, Milwaukee, Detroit, Chicago, Kansas City, Denver, Dallas, Los Angeles, Seattle



HEILINER SCRAPER TRACTOR DRAWN SCRAPERS CONVERSION HOIST CONTRACTOR'S BODY

Get full details of this month's new products... mail your Readers' Service card today.

To order these helpful booklets check the coupon on page 28.

## STREETS AND HIGHWAYS

### Better Mowing and Brush Removal

30. Fast, versatile Wood rotary mowers are available in seven models to suit all types of municipal maintenance. Upkeep costs for roadside mowing, brush cutting, leaf mulching, park maintenance can all be reduced with efficient equipment. Get full details by checking the coupon. Wood Bros. Mfg. Co., Box 148B, Oregon, Ill.

### Do You Have Complete Black Top Equipment Data?

41. In 36-page catalog AA a full line of maintenance is covered. Units described and illustrated include several models of pressure distributors, supply tanks, sprayers, brooms, asphalt kettles, portable rollers, and accessory tools. Use coupon for copy of this handy manual. Littleford Bros., 452 E. Pearl St., Cincinnati 2, Ohio.

### Faster Compaction On Street Repairs

100. Holes and trenches cut through pavement present difficult areas for compaction of backfill. Learn how to do the job quickly, easily and cheaply by using the self-contained, portable Barco Rammer. Full data on this low cost will be found in Bulletin 621. Write Barco Mfg. Co., 500 N. Hough St., Barrington, Ill., or check the coupon.

### Reference Manual on Guardrail Design

114. Here is an interesting and informative booklet in which all factors influencing guardrail design are outlined, and safety and economy discussed in detail. Eight pages are devoted to basic design data, with handy tables covering physical properties, tensile and beam strengths, deflection and other data. Write Armo Drainage and Metal Products, Inc., Dept. PW, Middletown, Ohio.

### How to Save Time on Curb and Gutter Work

143. Every type of curb and gutter work is illustrated in the 12-page Heltzel catalog on steel forms for building concrete curbs, gutters and sidewalks. Time-saving setups show how to speed up the job and save money. Get your copy from Heltzel Steel Form & Iron Co., Dept. PW, Warren, Ohio.

### Black-Top Paver Offers Many Advantages

150. The flexible Adnurn Black Top Paver lays any asphalt mix, hot or cold, in widths from 6 ft. to 13 ft. Careful design lowers operating cost and cuts maintenance. Attachments spread stone, cinders or slag. Get full data on this machine by checking coupon. The Foote Co., 1954 State St., Nunda, N. Y.

### Hot or Cold Patching Mixtures Prepared on the Job

304. By preparing your patching mixtures, hot or cold, right on the job, you can use them immediately with a minimum of handling. Get full data on the McConaughay Model HTD "Multi-Pug" Asphalt Mixer for fast, easy and economical preparation of patch materials. Write K. E. McConaughay, Lafayette, Ind., or use the coupon.

### Choosing Trucks For Municipal Service

264. For all municipal services, trucks are needed that are high in efficiency and economy. Be sure to investigate the White 3000, engineered for high performance. Full details on White Super Power trucks from the White Motor Company, Cleveland 1, Ohio.

### Excellent Booklet Shows Aerial Mapping Technique

235. A clear explanation of the technique of aerial topographic map production is given in "Air Speeds Your Map Needs." Striking photographs trace aerial photos step-by-step to the final maps for highway location, city and regional zoning and planning, traffic studies,

drainage and watershed projects, tax maps and many other types of work. Use the coupon to get this excellent booklet for public works and planning officials. Jack Ammann, Photogrammetric Engineers, 829 N. St. Mary's St., San Antonio 2, Texas.

### How the Mobil-Sweeper Can Improve Street Sweeping

305. Sweeping costs can be cut with the Mobil-Sweeper which features safe highway speeds up to 55 mph, carries 2 2/3 cu. yd. dirt hopper, sweeps swath up to 10' wide with full floating brooms. Hills and deep gutters are no obstacle. Write to The Conveyor Co., 3260 E. Slauson Ave., Los Angeles 58, Calif. or use coupon for complete details on this machine.

### Latest Data on Rubber Roads

296. A report covering all developments to date on the use of natural rubber in road surfacing of asphalt highways has been issued by the Natural Rubber Bureau, 1631 K St., N. W., Washington 6, D. C. Get your copy of this 52-page booklet which includes new data on research and full reports on test roads in many states. Use the handy coupon.

### Use Hot Patch Material On All Maintenance Jobs

297. With the Barber-Greene Mixall you can get hot patch material wherever and whenever you need it for all maintenance jobs. Send for new 8-page bulletin that gives full information on this small, highly portable unit that turns out all types of bituminous patch material in any quantity you need. Write Barber-Greene Co., Aurora, Ill., or use the coupon.

### Vacuum Cleaning Answers Leaf Problem

227. The Elliott vacuum leaf loader quickly sucks wet or dry leaves from the street and deposits them into a collecting truck for easy disposal. All-season use for removal of paper and other debris. Details on this time and labor saving unit in bulletins from M. A. Elliott, 5 State St., Troy, N.Y. Check the coupon.

**GOLDAK** MODEL 87 PIPE LOCATOR

Does the work of heavier, bulkier locators yet weighs only 11 pounds complete... shows EXACT location of mains, services, valves and stubs. Accurately measures depths of Pipes and Cables. One Man Operation! Rugged Reliability! Economical! Tubes, Batteries and Parts! Comes complete, Ready to use!

Write for FREE Literature

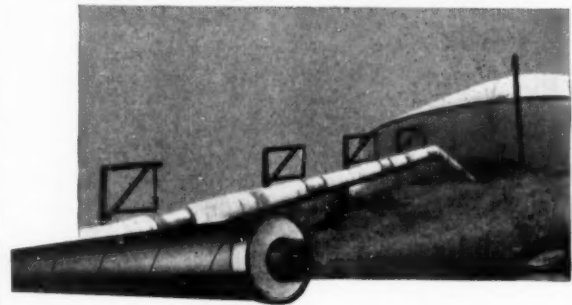
The **GOLDAK** Company  
Creating Methods of  
PIPE LOCATION  
Since 1950

1545 WEST GLENOAKS BLVD.

T.M. Reg.

U.S. Pat. Off. GLENDALE 1, CALIFORNIA

## RIC-WIL KEEPS THIS WATER LINE FROM FREEZING!



Project: Water Works Improvement; Ishpeming, Michigan.  
Consulting Engineer: Drury, McNamee & Porter; Ann Arbor, Michigan.  
Contractor: L. W. Brumm; Marquette, Michigan.

This overhead Ric-wil pipe line, connecting an elevated storage tank to the distribution system, is protected from freezing even during winter temperatures as low as -40° F.!

For normal flow, ample thermal efficiency is assured by using 3" thick Fiberglass insulation, with a 3/4" dia. steam tracer provided for stand-by use if required.

The 12" steel water line is coated on the inside with Ricwilit phenolic resin for corrosion resistance, and the entire prefabricated system is housed inside 21" dia. RIC-WIL HEL-COR Conduit for protection against the elements.

**Ric-wil**  
PREFABRICATED  
INSULATED PIPING

UNDERGROUND OR OVERHEAD

THE RIC-WIL COMPANY - CLEVELAND, O.



the only thing that  
**PAYS-OFF**  
 in a bituminous  
 plant is...



**TONNAGE**  
Produced!

**EVERY FEATURE OF THE BARBER-GREENE 848 PLANT  
 WAS DESIGNED TO INCREASE TONNAGE PRODUCTION**

There is nothing to equal the constant, low-cost, top-capacity production of the 848 plant that provides 80 to 140 tons per hour of the finest bituminous mix.

*Its portability* means less moving time. Its separate components mean less set-up time. Its automatic, interlocked operation assures accuracy and means less loss due to the human element.

*Its simplicity* of operation and quality construction mean less down time. Its unique simple sampling means less interrupted time.

*Its adaptability* to all types of mix, including stabilized mixes, means more profitable production.

See your B-G Distributor for complete information on the high capacity 848 Bituminous Plant.

**Barber-Greene**

Aurora, Illinois, U. S. A.



It's a fact... our handy Readers' Service card is the way to get new catalogs.

To order these helpful booklets check the coupon on page 28.

### Patching and Maintenance With Bitumuls

283. Proper maintenance of paved surfaces is the subject of an informative 24-page booklet "Bitumuls for Maintenance" published by American Bitumuls & Asphalt Co., 200 Bush St., San Francisco 4, Calif. Profusely illustrated and well-written, this text gives step-by-step descriptions of patching and other surface maintenance operations. Check the coupon now to order your copy.

## WATER WORKS

### Head Loss Data On Plastic Pipe

26. Carlon Products Corp., 10225 Meech Ave., Cleveland 5, Ohio, announces that authoritative data has been compiled on head loss due to friction in Carlon plastic pipe and is available in the form of graphs and charts. The graphs show superior flow characteristics, attributed to the fact that plastic pipe is not "wetted" by water. Send for this data today by using the handy coupon.

### The Modern, Streamlined Elevated Tank

32. An 8-page bulletin describes the Watersphere, a modern elevated water tank of welded steel construction for general service gravity water pressure and fire protection. Construction details, illustrations of typical installations and table of standard sizes from 25,000 to 250,000 gallons capacity are included. Check the coupon. Chicago Bridge & Iron Co., 2115 McCormick Bldg., Chicago 4, Ill.

### Painting Water Tanks For Longer Protection

52. High labor costs demand special consideration when painting elevated water tanks. This and other factors involved in proper paint selection are discussed in a bulletin issued by Jow, Dixon Crucible Co., Jersey City 3, N. J. Helpful specifications for repainting water tanks are also included. Check the coupon today.

### Data on Cutting-In Valves, Repair Sleeves and Accessories

33. A variety of Clow products for installation and repair of cast iron pipe lines, including the Eddy cutting-in valve and sleeve, split sleeves for pipe repair, test plugs, valve boxes, Strickler pipe cutters and other fittings and accessories are featured in literature available from James B. Clow & Sons, Inc., Box 6600-A, Chicago 80, Ill. Check the coupon.

### What's Your Digging Problem? Repair Work? Trenches? Footings?

35. At today's prices, hand digging means the job will be costly. You can dig through asphalt and macadam, work fast and efficiently even in cramped areas with the tractor mounted Sherman Power Digger. From one position you can reach to dig 10 feet behind tractor in 140° arc and to depth of 8 feet. For full details check the coupon. Sherman Products, Inc., Royal Oak, Mich.

### What You Should Know About Chemical Proportioning Pumps

38. In an attractive new bulletin you will find latest information on the Heavy-Duty Chem-O-Feeder, plus many installation diagrams, construction and operating details, list of chemicals fed and other helpful information on constant rate and flow proportional chemical feeding. Get your copy from Proportioners, Inc., Providence 1, R. I., by checking the coupon.

### Efficient Coagulation With Ferri-Floc

69. Advantages claimed for Ferri-Floc as a coagulant include wide pH range, quick floc formation, manganese removal, control of certain tastes and odors, plus other aids in high quality water production. Check coupon for complete Ferri-Floc data. Tennessee Corp., Grant Bldg., Atlanta, Ga.

### Tested Jointing Materials

102. "Hydrotite" is a self-caulking, self-sealing joint compound for well and spout pipes. For data book and sample write Hydraulic Development Corp., 50 Church St., New York, N. Y.

### Theory and Application Of the Flow Tube

84. Hydraulic formulae, head capacity curves and test data for this primary metering element are given in a technical bulletin, "Theory and Application of the Flow Tube," available from Foster Engineering Co., Union, N. J. Check the coupon for a copy.

### Pressure Pipe That Retains Capacity

106. Several bulletins describing the construction of pressure pipe, list of installations, carrying capacity tests, making service connections under pressure, and detail descriptions of several installations. Lock Joint Pipe Co., Box 269, East Orange, N. J.

### Makes Underground Pipe Installations Easy

115. One-man operated hydraulic pipe pusher pushes pipe through ground under streets, sidewalks, lawns and other obstacles. Pays for itself in man hours saved on first few jobs. For complete facts ask for Form E-213, Greenlee Tool Co., Rockford, Ill. Just check the coupon.

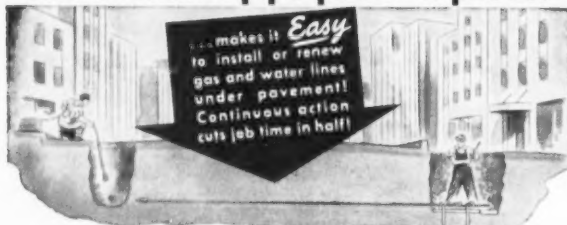
### Discussion of Ranney Method For Municipal Water Production

116. A very interesting study of municipal and industrial water supply problems and a complete discussion of Ranney Collectors for water production will be found in a 20-page booklet published by Ranney Method Water Supplies, Inc., Box 277, Columbus 9, Ohio. Water quality, construction methods, costs, performance and other topics are considered. Check the coupon to get your copy.

### How Accurate Boring Speeds Underground Pipe Installations

135. Interesting charts showing earth boring costs, speed and accuracy for holes from 2 1/2" to 14 1/2" diameter and up to 80 feet long are included in 16-page Catalog No. 8 issued by Hydratung Corp., 681 Market St., San Francisco 5, Calif. Specifications and general operating instructions are also covered.

## The TROJAN pipe puller & pusher



MODEL A for  
1/2" to 1" pipe



MODEL B for 2"  
pipe and under



**WRITE TODAY  
FOR FULL DETAILS**

With a Trojan, no resetting of grip is required—job goes twice as fast. Heavy duty, all steel construction makes it 4 times stronger than cast iron pusher.

Model A needs only 5 ft. trench. One man can easily lift it in and out of trench and install the average service. 15 tons of pushing pressure possible.

Model B has 3 pushing speeds for different soils. Reversible in 30 seconds.

Double XX heavy, 30" push pipe travels straighter.

## The TROJAN Manufacturing Co.

1114 Race Drive • Troy, Ohio

41 Greenway, Hamden, Conn. • Box 465, Memphis, Tenn.

## HELLIGE TURBIDIMETER

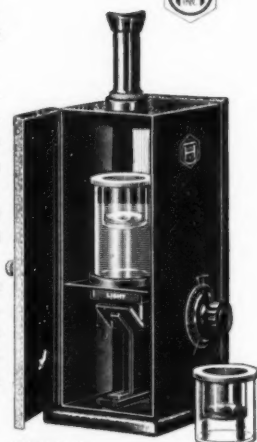
A TURBIDIMETER WITHOUT STANDARDS

FOR TURBIDITY MEASUREMENTS,  
SULFATE DETERMINATIONS, AND  
SPECIAL APPLICATIONS

Modern in design and operating principle, the Hellige Turbidimeter does not require standard suspensions or long cumbersome tubes. Accurate readings can be made rapidly by those without technical training.

Precise determinations are performed in the ranges of zero to 150 p.p.m. SiO<sub>2</sub> and zero to 100 p.p.m. SO<sub>4</sub>. Higher values are determined by diluting the specimen.

Send for Catalog No. 8000-A



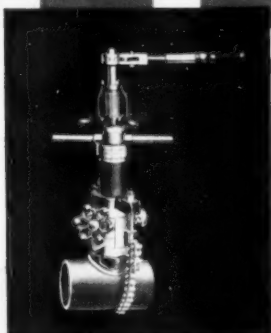
**HELLIGE Inc.**

877 STEWART AVENUE, GARDEN CITY, N. Y.

# MUELLER

## "B" Tapping and Inserting Machine

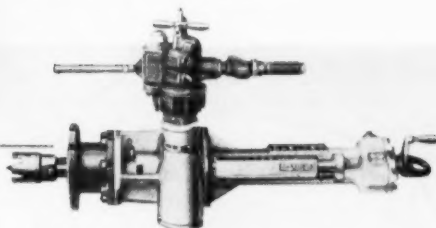
Drills and taps mains and inserts corporation stops,  $\frac{1}{2}$ " to 1", under pressure... may be used on dry taps,  $\frac{3}{8}$ " to 2 $\frac{1}{2}$ "... similar machines available in larger sizes.



## FOR THE FINEST IN WATERWORKS EQUIPMENT

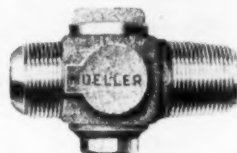
## "C-1" Drilling Machine

Makes cuts 2" to 12" in any size main... dry or under pressure... power-operated with H-600 Air Motor or H-602 Gasoline Engine Drive Unit... hand-operated model also available.



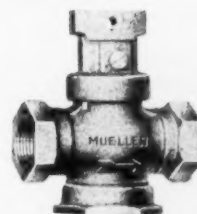
## Corporation Stops

Designed for insertion in mains under pressure with Mueller Tapping and Inserting Machines... wide range of sizes and types... variety of inlet threads... fully tested.



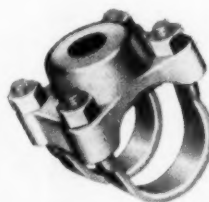
## Curb Stops

Ground key stops... steeper taper on key prevents sticking and allows easy operation... inverted key or solid tee head type available... wide range of sizes... fully tested.



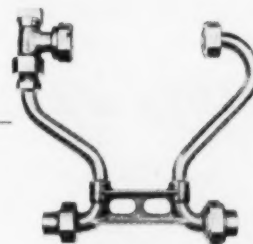
## Service Clamps

Designed for cast iron, steel, asbestos cement, or wrought iron pipe... double or single strap... full length threads... neoprene or lead ring gaskets... wide range of sizes and tapings.



## Meter Setting Equipment

Copper or iron meter yokes... flat head or lock wing angle stops... meter couplings... complete line available... variety of threads and outlets.



## Gate Valves

Exclusive four-point contact wedging mechanism assures positive seal... fully bronze mounted... maximum corrosion resistance... conventional packing or "O" Ring Seals... rising or non-rising stems A. W. W. A.



## Fire Hydrants

Improved and standard types... designed and built for long life and trouble-free service... safety flange reduces collision damage... A. W. W. A.



► These products are just a portion of the complete selection of waterworks equipment, supplies and specialties offered by Mueller Co. and designed and manufactured to their characteristically high standards.

## MUELLER CO.

Dependable Since 1857

MAIN OFFICE & FACTORY DECATUR, ILLINOIS

Need more facts about advertised products? Mail your Readers' Service card now.

To order these helpful booklets check the coupon on page 28.

WATER COMMISSIONERS  
OF THE  
TOWN OF WATERFORD, N. Y.

September 15, 1952

Simplex Valve and Meter Co.,  
68th & Upland Sts.  
Philadelphia 42, Pa.

Dear Sirs:

Please send us two (2) rubber diaphragms  
for Simplex rate controller #6 111325 B.

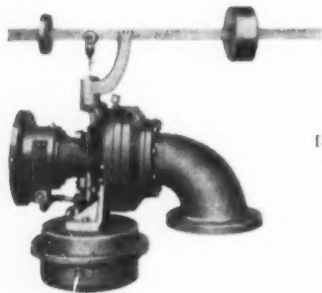
Might be of interest to know that this is  
second replacement of diaphragm since 1914.

Respectfully yours,

*R. E. Gaffey*

Water Commissioners,  
Waterford, N. Y.  
Supt.

*Another proof that  
Simplex is reliable in the long run!*



Simplex Type S  
Rate of Flow  
Controller

[Supersedes Type B Controller Referred to in Letter]

For full details, write:  
Simplex Valve & Meter Company,  
6750 Upland St., Philadelphia 42, Pa.

# SIMPLEX®

VALVE AND METER COMPANY

## How Your Filter Washing Can Be Improved

136. More thorough sand washing with the elimination of mud balls and cracking with resultant longer filter runs are claimed for the Palmer Filter Bed Agitator, described in bulletins issued by the Palmer Filter Equipment Co., P. O. Box 1655, Erie, Pa.

## Helpful Data on Mechanical Joints

138. Get Circular 49 from M & H Valve & Fittings Co. for important information and installation dimensions of M & H AWWA Mechanical Joint Valves and Hydrants. Features include ease of installation, construction economy, long life. Use coupon or write M & H Valve & Fittings Co., Anniston, Ala.

## Engineering Data on Diatomite Filters

139. Get complete data on the Sparkler model SC-J diatomite slurry feed filter for swimming pools from the Sparkler Mfg. Co., Mundelein, Ill. Check the coupon for full information including table of filter sizes and capacities, space required and filter operation.

## Faster Pipe Laying With Precaulked and Threaded Joints

148. McWane 2" cast iron water pipe with threaded joints and precaulked bell and spigot pipe are described in folder WM-47. Additional data on 3" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

## Inserting Valves Without Shutdown

162. Do you have the latest data on equipment for inserting control valves where shutdown is impractical? Mueller catalogs H-20 and H-602 give all details on inserting valves and equipment, using hand-operated or power operated machines. Get these catalogs today by checking the coupon. Mueller Co., Decatur, Ill.

## What You Should Know About Meter Setting and Testing Equipment

166. Complete details on all equipment and proper methods for meter testing and installation are included in an excellent book published by Ford Meter Box Co., Wabash, Ind. All waterworks men concerned with setting and testing of water meters should have a copy of this book. Write for Catalog No. 50.

## Pipe Joint Essentials and Couplings for Every Job

168. Superior pipe joints are tight, flexible, simple, strong and economical. Dresser's handsome 34-page bulletin No. 513 shows how these essentials are met and provides layouts for curves, working pressures and a wealth of other data. Be sure to check this bulletin on the coupon. Dresser Mfg. Div., 59 Fisher Ave., Bradford, Pa.

## Handy Calculator for Cast Iron Pipe

175. With the handy Cast Iron Pipe Calculator you can determine at a glance the class, weight and dimensions of bell and spigot pipe. This slide-rule type calculator is absolutely free. Use coupon or write R. D. Wood Company, Public Ledger Bldg., Philadelphia 5, Pa.

## What You Should Know About The Centrline Process

197. The Centrline method for lining mains in place to stop leaks, prevent corrosion and increase carrying capacity is fully described in a handsome booklet issued by the Centrline Corp., 140 Cedar St., New York 6, N. Y. Many illustrations and typical case histories show the operation and economies of this process. The Tate process for lining smaller mains is also covered. Check coupon for your copy.

## Complete Booklet on Pipe Line Equipment

246. Equipment for all types of jointing, maintenance and repair jobs on water, gas and sewer lines is described and illustrated in Catalog No. 25 issued by Joseph G. Pollard Co., New Hyde Park, N. Y. Leak detectors, pipe finders, melting kettles, cleaning tools and a full line of hand tools for water and sewer departments, and many other items are included. Be sure to get your copy now. Just check the coupon.



# HERE'S POWER

That Really Pays Off

High-Cycle Power from

# HOMELITE

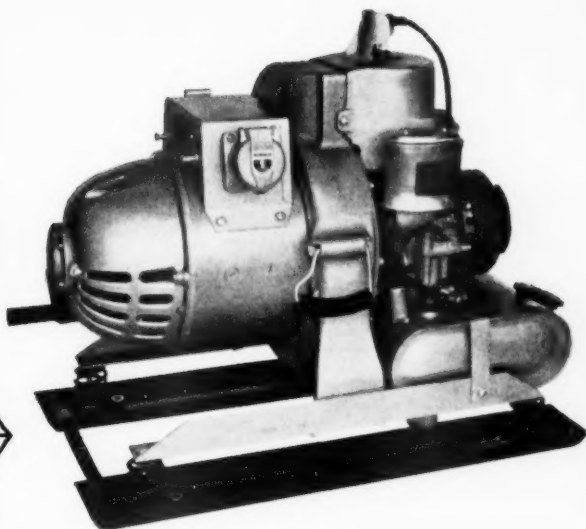
Carryable

## GENERATORS

With high cycle power you operate faster, lighter weight, more efficient electric hand tools . . . high cycle drills, grinders, impact wrenches, concrete vibrators and chain saws. You're on the right track to faster, lower cost maintenance. And the unit that puts you on this track is the Homelite Gasoline Engine Driven *Dual Purpose* Generator . . . the first and best of its kind ever developed.

Small, compact . . . light enough to be picked up and carried . . . a Homelite can be put into operation any place quickly. And it provides plenty of power . . . not only high cycle power but also regular power for your standard universal tools and floodlights. That's right, both from the same generator.

Why not, right now, write for a free demonstration and see what a Homelite Dual Purpose Generator can actually do for you?



For operating Homelite high cycle chain saws



For operating high cycle concrete vibrators

Manufacturers of Homelite  
Carryable Pumps • Generators  
Blowers • Chain Saws



# HOMELITE

CORPORATION

2107 RIVERDALE AVENUE • PORT CHESTER, N. Y.

Canadian Distributors: Terry Machinery Co., Ltd., Toronto, Montreal, Vancouver, Quebec.

### Helpful Data On Pipe Tools

230. Toledo drop head ratchet threaders are light, compact, ideally suited for work in tight corners. Three models for  $\frac{1}{4}$ " to  $\frac{3}{4}$ ";  $\frac{1}{2}$ " to  $1\frac{1}{2}$ "; and  $\frac{3}{4}$ " to 2" pipe all feature quick change of sizes. Get Catalog 11a52 from Toledo Pipe Threading Machine Co., Toledo, Ohio. Check the coupon.

### Helpful Valve Catalog For Engineers

236. For complete descriptions of Darling double disc, parallel seat gate valves be sure to get Bulletin 5002 issued by Darling Valve & Mfg. Co., Williamsport, Pa. Construction details covering all valve parts and accessories are helpful for specification writers. Check the coupon for your copy.

### All About Centrifugal Pumps

258. Where pumping performance counts you want to check your specifications carefully. Investigate the features of Fairbanks-Morse centrifugals. Use coupon or write to Fairbanks, Morse & Co., Dept. PW, Chicago 5, Ill.

### Inexpensive Crane For Water Department

261. Handling pipe, hydrants and valves; form pulling; and many other jobs that require a light-weight, economical crane can be solved with the versatile Pitman Hydra-Lift, an inexpensive crane that fits on the frame of any  $1\frac{1}{2}$  ton or larger truck. Get the full story by checking the coupon. Pitman Mfg. Co., 300 W. 79th Terr., Kansas City, Mo.

### How to Compute Quantities of Jointing Materials

271. A helpful table for determining quantities of "Tegul-Mineraloid" required, using jute or "Hyde-Ro Rings", plus complete answers to your questions on sulfur compound jointing materials will be found in Bulletin M-10 issued by Atlas Mineral Products Co., Mertztown, Pa. Check the handy coupon today.

### Water Lines Under Pavements Easily Installed

247. With a Trojan pipe pusher and puller no resetting of grip is required, so the work goes twice as fast. Two models, for pipe up to 2" dia. Get full details by checking the coupon. Trojan Mfg. Co., 114 Race St., Troy, Ohio.

### Test Kit For Swimming Pools

269. Tests needed for scientific control and maintenance of swimming pool waters may be performed easily with the Hellige Twin-Kit. Twin pocket-size comparators with non-fading glass color standards are used for pH and chlorine or bromine determinations. Folder No. 800-F give full details on this convenient outfit. Get your copy by checking the coupon. Hellige, Inc., Garden City, N. Y.

### Gauges for Good Filter Plant Operation

275. Mechanically operated filter gauges for indicating and recording loss of head, rate of flow, sand expansion and other data needed for good filter plant operation, are described in Bulletin No. 450-1110, issued by Builders-Providence, 356 Harris Ave., Providence 7, R. I. Besides details on the gauges themselves, typical installations are shown. Check coupon for your copy.

### Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in a convenient booklet offered with the compliments of U. S. Pipe and Foundry Co., Burlington, N. J. Get your copy by checking the coupon.

### Handy Catalog Covers All Pipe Repairs

290. A complete catalog covering repair clamps, packings and gaskets of several designs

to suit all needs is offered by Smith-Blair, Inc., So. San Francisco, Calif. Directions for use show ease of application. Every water works needs a copy of this catalog for ready reference. Available by using the coupon.

### Factors to Consider in Elevated Tank Selection

299. Details on the several different types of elevated steel tanks, including capacity ranges, tank dimensions and other factors to be considered in the selection of elevated tanks for modern water storage, plus discussions of new tanks for old towers and foundations are included in Bulletin 101 of the Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa. Check coupon for your copy.

## REFUSE COLLECTION AND DISPOSAL

### Quel—For Control Of Garbage Odors

27. A new product, Quel, is offered to stop odors from garbage and waste. A small quantity of this liquid is said to sanitize garbage containers, kill maggots, repel flies and other pests. Get full details from W. B. Farrell, Inc., 1960 Opydyke Rd., Pontiac, Mich. Check the coupon.

### Sanitary Landfill Operation and Methods

28. The location and area requirements for sanitary landfill, operation methods for trench type and area fills, equipment selection and costs are items discussed in an 8-page booklet issued by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Be sure you have this reference when considering the problem of garbage and refuse disposal. Check the handy coupon today.

**P.F.T.  
DIGESTER  
HEATER  
AND  
HEAT  
EXCHANGER**



**TEMPERATURE CONTROLLED**

P. F. T. Heaters provide close digester temperature controls, assuring highest possible gas production and digested sludge quality. Fired with sewage sludge gas or oil or a combination of fuels. Also utilize waste heat from engine jacket water. Write for Bulletin 135.

**PACIFIC FLUSH TANK CO.**

*Waste Treatment Equipment Exclusively Since 1893*

4241 BAYVIEW AVE. CHICAGO 13, ILLINOIS

NEW YORK • LOS ANGELES • SAN FRANCISCO • CHARLOTTE, N. C. • JACKSONVILLE • DENVER



**THE "Quinn Standard"**

**FOR CONCRETE PIPE**

The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 35 years' service in the hands of hundreds of Quinn-educated contractors, municipal departments and pipe manufacturers who know from experience that Quinn pipe forms and Quinn mixing formulas combine to produce the finest concrete pipe at lowest cost.

**QUINN HEAVY DUTY PIPE FORMS**

For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell end pipe at lowest cost.

**WRITE TODAY.** Complete information, prices, and estimates sent on request.

Also manufacturers QUINN CONCRETE PIPE MACHINES

**QUINN WIRE & IRON WORKS 1621 12th ST. BOONE, IA**

## BUILD BETTER SEWER LINES



with  
**WESTON  
GASKETS and FORMS**  
for  
**SEWER PIPE JOINTS**  
(a cement joint)

- No jute used—gasket centers spigot.
- Definite space in each joint for cement.
- Form confines cement-grout in lower portion of joint.
- Particularly advantageous in water-bearing trenches.
- Infiltration minimized.

**L. A. WESTON CO.**

Adams  
Mass



### M-SCOPE PIPE — LOCATOR

Light Weight Model AB

**Only \$149.50**

Superior Performance  
at Lower Cost

Pipe Finder — Leak Detector  
Combination Type BL \$197.50

Free Illustrated Lit.

**FISHER RESEARCH LAB., INC.**

PALO ALTO

CALIF.



Left: Bruce Street, Alexandria's first soil-cement street, was paved in 1939.

Below: Woodland Terrace, a typical residential street, paved with soil-cement, 1941.



## **SOIL-CEMENT** paves the way to durable, economical streets in Alexandria, Va.

**I**N 1939, Alexandria, Va., experimented with soil-cement paving in a one-block-long project on Bruce Street. This pavement withstood the severe winter of 1939-40 without a single surface break while virtually every other secondary street in the city suffered heavily from the extreme weather.

That demonstration, plus soil-cement's low first cost, convinced city officials of soil-cement's practicability for light-traffic streets. Since then more than 200,000 sq.yd. of soil-cement pavement have been placed in Alexandria. The superior performance of that paving prompted the City Council in 1948 to pass an ordinance specifying soil-cement base with bituminous surface for light-traffic streets in residential zones and concrete for heavier-duty streets.

C. L. Watkins, Alexandria City Engineer, writes: "The first winter's experience on Bruce Street has been followed by more than 10 years of added serv-

ice. Our records show that there has been practically no maintenance on the soil-cement base.

"Our choice of soil-cement is predicated on two important factors—economy and durability, plus the fact that our soil conditions are favorable. The initial cost and low-maintenance cost of all-weather soil-cement base make it economical. Its durability is proved by its record to date of carrying daily traffic for over 10 years. In my opinion, the use of soil-cement is a major and permanent asset to our city."

Here's why soil-cement roads and streets are economical: (1) about 85 per cent of the required material is usually native soil already on the site, (2) construction is fast—large daily production, (3) inexperienced crews can quickly learn the simple construction procedures. For more information about economical, durable soil-cement roads and streets, write for free booklet available in U. S. and Canada.

## **PORTLAND CEMENT ASSOCIATION**

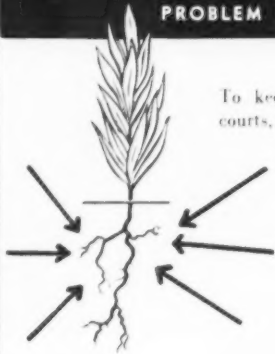
DEPT. A7-89, 33 WEST GRAND AVENUE, CHICAGO 10, ILLINOIS

A national organization to improve and extend the uses of portland cement and concrete through scientific research and engineering field work

To order these helpful booklets check the coupon on page 28.

## GET THOSE WEED ROOTS!

GO TO THE ROOT OF YOUR WEED  
PROBLEM WITH THESE DOLGE PRODUCTS



To keep weeds off drives, walks, parking lots, tennis courts, sand traps you've got to finish the roots.

DOLGE SS WEED-KILLER does that—and more. It kills the foliage, of course. It works down deep. It tends to sterilize the soil so that wind-blown seeds cannot sprout in it. Diluted as directed, it can kill the toughest weeds. Spray or sprinkle where you want no growth whatsoever.

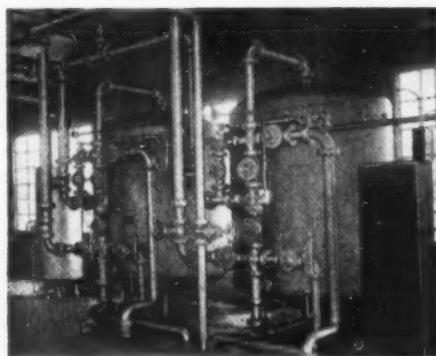
E.W.T. is the Dolge 2, 4-D Selective Weed-Killer. It finishes dandelions, plantain and other broad-leaved weeds in turf—does not harm good lawn grasses. It translocates; is absorbed and travels through the sap to the roots.

FOR FREE  
SANITARY SURVEY  
of your premises  
consult your  
DOLGE SERVICE MAN

See your Dolge Service Man—he will call soon.  
Write for the Dolge booklet on chemical weed control.

*dependable*  
**DOLGE**  
WESTPORT, CONNECTICUT

## LAKESIDE EFFICIENT WATER SOFTENING



Lakeside uses different kinds of zeolites, and accessories to meet your particular needs in a softener. Such care insures high capacity, minimal cost, long life and ease of operation. Bulletin 78 tells you a great deal about zeolite softening, including the capacities of the various zeolites,

how to determine the amount of zeolite required and how to compute the dimensions for any softening unit.

Sectional drawings show the details of construction of the softeners, and full data are presented on manual, semi-automatic and fully automatic control.

Send for Bulletin 78 now if you have a hard water problem.

**LAKESIDE ENGINEERING CORP.** 222 West Adams Street  
Chicago 6, Ill.

### How to Reduce Refuse Collection Costs

123. The sequence of operations for fast loading and refuse compaction in the Gar Wood Load-Packer are illustrated and described in 12-page folder W-110, together with size data and details of hydraulic elements. Be sure to check all details of the efficient Load-Packer system. Check coupon or write Gar Wood Industries, Wayne Division, Wayne, Mich.

### Efficient Material Handling to Reduce Incineration Costs

130. Blaw-Knox buckets specially designed for refuse and garbage handling are described in 22-page Bulletin 2350. Illustrations show progress of material through a modern municipal incinerator plant. Dimensions and incinerator bucket specifications are included. Blaw-Knox Div., 2124 Farmers Bank Bldg., Pittsburgh 22, Pa.

### Increasing the Efficiency of Bulk Rubbish Collection

177. Strategically spotted bulk containers can be handled by one man operating a Dempster-Dumpster equipped truck. Get full details of this cost-saving system of rubbish collection, as used by many cities to increase efficiency and eliminate unsanitary conditions. Write Dempster Brothers, Inc., 952 Dempster Bldg., Knoxville 17, Tenn., or use the handy coupon.

### Thinking of Sanitary Fill? Get This Booklet Now

285. Good management of sanitary landfills requires rugged, dependable equipment to excavate dirt, compact refuse and handle cover material. Such equipment, in use on landfill projects coast to coast, is featured in a new 8-page booklet titled "Community Workers," issued by the Caterpillar Tractor Co., Peoria 8, Ill. Check the coupon for a copy.

### Efficient Refuse Collection Unit Carries Bigger Load at Lower Cost

266. Nine features which result in new economy, efficiency and cleanliness of the Heil "Colecto-Pak" are outlined in illustrated Bulletin BH-53100, issued by the Heil Co., Milwaukee 1, Wis. Be sure to check all the ways this easy loading quick dumping unit is designed to help you do a modern, sanitary refuse collection job. Check the coupon now.

## BUSINESS AND ADMINISTRATION

### How to Save On Automobile Insurance

208. Employees of the municipal, county, state and federal governments should investigate the savings on automobile insurance available to them through Government Employees Insurance Co., Govt. Employees Insurance Bldg., Washington 5, D. C. Check the coupon for details.

## WEED CONTROL

### Chemical Weed Killers Are Fast and Effective

117. Be sure to check Polybor-Chlorate and concentrated Borasol for fast, economical non-selective destruction of weeds and grasses. Features and applications of these effective products are outlined in bulletins available from Pacific Coast Borax Co., 630 Shatto Pl., Los Angeles 5, Calif. Check coupon for full data.

### What You Should Know About Chemical Weed Control

132. In a convenient 44-page book, the C. B. Dolge Co. gives full details on spraying procedures and chemicals to use for control of lawn and roadside weeds, ragweed eradication and insect control in turf. Get your copy by checking the coupon or write C. B. Dolge Co., Westport, Conn.

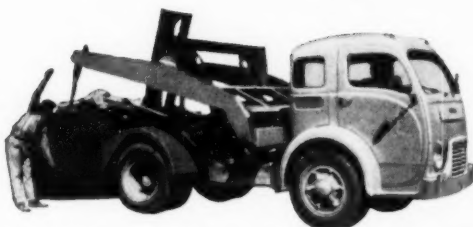
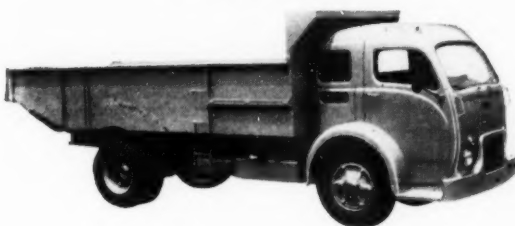
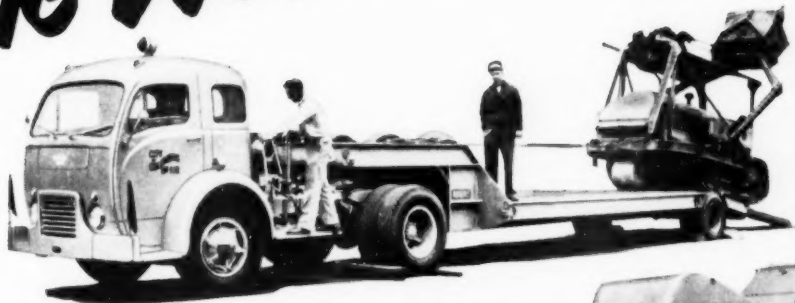
USE Coupon on Page 28



# SPOTLIGHT on the

**MOST USEFUL... MOST VERSATILE  
TRUCK**

*in public services...*  
**The WHITE 3000**



HERE are just a few of the many outstanding applications of the White 3000—America's most advanced motor truck in public service.

Everywhere...every day...cities and counties are saving many hours of time...cutting costs...adding efficiency because of this *new* kind of truck, tailored to exact applications of a wide variety.

Get the full story from your White Representative.

**THE WHITE MOTOR COMPANY**  
Cleveland 1, Ohio

*Tips its cab to service!*



**FOR MORE THAN 50 YEARS THE GREATEST NAME IN TRUCKS**

Get full details of this month's new products... mail your Readers' Service card today.



## MEXICO CITY

*Modernizes With*

## FLEXIBLES!

*Places  
Largest Order*  
**FOR SEWER-CLEANING EQUIPMENT**  
*In History!*

Above is a "partial shipment," shown with operators. Modern city administrations everywhere are invited to write for the FACTS ABOUT "FLEXIBLES."

**Flexible** **SEWER-ROD EQUIPMENT CO.**

9059 VENICE BOULEVARD, LOS ANGELES 34, CALIF.  
(BRANCHES IN PRINCIPAL CITIES)

The progressive new present administration of Mexico City was appointed by the President of Mexico on its pledge to remedy past negligence. One of its first steps was to order more than \$297,000 worth of Flexible Sewer-Cleaning equipment to clean and maintain its more than 9,000 miles of sewer, some of which is over 300 years old. Twenty-five freight cars were required to ship the 170 Flexible Bucket Machines, cables, rods, buckets, etc. in this—"the world's largest order of its kind." Flexible equipment was selected after careful and scientific investigation and thorough demonstration!

**AMERICA'S LARGEST MANUFACTURER OF PIPE CLEANING TOOLS AND EQUIPMENT**

**Hit it again, Butch!**  
**Fiber glass DURASIGNS**  
**can "take it!"**

**LOW COST • TOUGH • RUSTPROOF**



Developed by the Navy and Air Corps for structural parts requiring unusual resistance to weather and stresses, Fiber glass reinforced laminates have quickly proved their superiority for Traffic control signs.

Durasigns have the strength of steel with only one-third the weight. They can "take" more weather, corrosive fumes and downright abuse than any other sign. They cannot rust; and they never need painting. Yet they actually cost less than comparable steel signs.

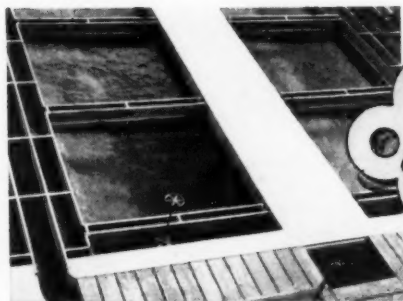
Durasigns are available in white or yellow, blank or with your choice of copy. Regular or reflectorized surface. Stock sizes: 12" by 18"—18" by 24"—24" by 24" and 24" octagon. Write for prices and details.

**DURASIGN DIVISION, The NUBONE COMPANY, INC.**  
**ERIE, PENNSYLVANIA**



It's a fact...our handy Readers' Service card is the way to get new catalogs.

# 4 KEYS TO BETTER WATER

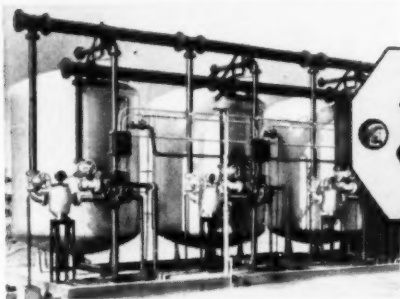


## 1. PRECIPITATORS

### PROBLEM: Turbidity, Color, Hardness, Iron, Alkalinity

PRECIPITATORS remove dirt, color, hardness, iron, alkalinity, silica, fluorides, taste, odor by coagulation, precipitation, and settling. Fully utilize the Permutit sludge-blanket principle for big savings in space . . . chemicals . . . time!

Horizontal or vertical designs of any capacity. Tailor-made units to triple capacities of old-fashioned settling basins.

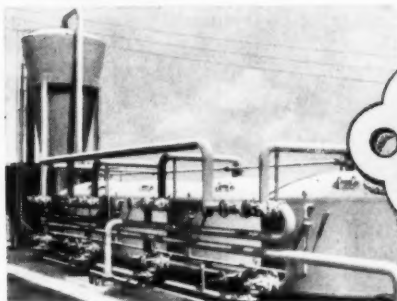


## 2. SOFTENERS

### PROBLEM: Hardness with Some Iron, Manganese

SOFTENERS quickly reduce hardness to zero . . . while removing troublesome iron and manganese. Simplest method. Gives positive results with no waste disposal problem. Features ease of operation, low installation and operating costs.

Pressure or gravity units or batteries—any capacity. Permutit automatic controls give uninterrupted supply of softened water, save operator's time, increase efficiency of old plants.



## 3. SPIRATORS

### PROBLEM: Hard, Clear Water

SPIRATORS soften on new principle—catalytic precipitation. Hard water and lime-soda swirl upward through catalyst granules. Precipitates deposit by accretion, fall to bottom, are easily disposed of. Water at top is soft, clear, ready for filtration. Total reaction time is eight minutes. Lime treatment with no bulky sludge disposal problem.



## 4. FILTERS

### PROBLEM: Traces of Dirt, Oil, Iron

FILTERS trap the last traces of suspended impurities, deliver a crystal-clear effluent. Permutit rapid sand filters are available in vertical or horizontal steel shells, and gravity types in wood or concrete. These units feature Permutit automatic controls. Wash, rewash and return to service—with no operator present!

**FREE WATER ANALYSIS!** Write today for free bulletins on these or any other water conditioning processes. Permutit will analyze your water supply, make recommendations without obligation. THE PERMUTIT COMPANY, Dept. PW-7, 330 West 42nd Street, New York 36, N. Y.

**PERMUTIT**<sup>®</sup>

WATER CONDITIONING HEADQUARTERS FOR OVER 40 YEARS

*Why a county foreman says...*

**"It pays to standardize on CAT\* equipment"**



**T**his Caterpillar No. 80 Scraper and D8 Tractor are 6½ years old, and still saving money for the taxpayers of Butte County, Calif. Every year they move about 100,000 yards of earth and build about 20 miles of road. And there's no "off season" for this husky yellow team. In the winter they remove 60 to 85 miles of snow—deep snow that has reached 15 feet at Stirling City.

On this job they're moving 30,000 yards of red clay and lava ash on a road widening and realigning project in Butte County. R. L. Hawks, road construction foreman, says, "They do more work with less trouble; there's no doubt that in the long run they can't be beat. We find it pays to standardize on Cat equipment."

The burly No. 80 Scraper hauls a heaped load of 20 yards. Being cable operated, it loads smoothly and can pump "dead" material. It gets rid of its load quickly and evenly with positive, fast-responding ejection. And the push block extends well behind the tires for powerful, in-line pusher action.

Like all Caterpillar machines, the No. 80 Scraper is built to stay on the job and out of the shop. Rugged construction and durable, high tensile steels mean that it will earn its keep for many years.

Your Caterpillar Dealer—who gives skilled service on the equipment he sells—will gladly give you an on-the-job demonstration of the Cat Scraper that fits your needs. Give him a call today.

Caterpillar Tractor Co., Peoria, Illinois.

**CATERPILLAR\***

\*Both Cat and Caterpillar are registered trademarks—(C)

**NAME THE DATE...  
YOUR DEALER  
WILL DEMONSTRATE**



# PUBLIC WORKS MAGAZINE

VOLUME 84 No. 7 • JULY, 1953

## PUBLIC WORKS

### For a Boom Defense Area

IN November, 1950, the Atomic Energy Commission announced the selection of the Savannah River area on the South Carolina-Georgia border for the location of a new atomic energy installation; one that at completion, would be among the largest industrial developments that the world has known.

The selected site comprised 315 square miles in a sparsely inhabited rural area. Nevertheless, its clearance required the evacuation and relocation of 1500 families; the complete demolition of two towns; and the abandonment of schools and churches. To proceed with the new construction, major highways serving the site had to be widened and rebuilt; provisions had to be made to accommodate large numbers of in-migrant workmen and their families—at the peak of construction 38,000 employees were on the construction payrolls—and public and private facilities generally had to be expanded to care for approximately 125,000 temporary residents, transients who constituted an increase of more than 50 percent in the population.

By January, 1953, the site had been cleared; construction of the plant was far along; and the peak of construction employment had been reached and passed. The first impact upon the region of this unprecedented industrial activity had been sustained without disaster and with only temporary discomfort. New schools were in session; new water works and sewerage systems were coming into use; new roads had been built; and new hospital and health facilities were available.

The rapid transformation of a rural to an industrial economy re-

quired the concentrated use of all local resources, the cooperative services of the AEC, and the effective application of Federal as-

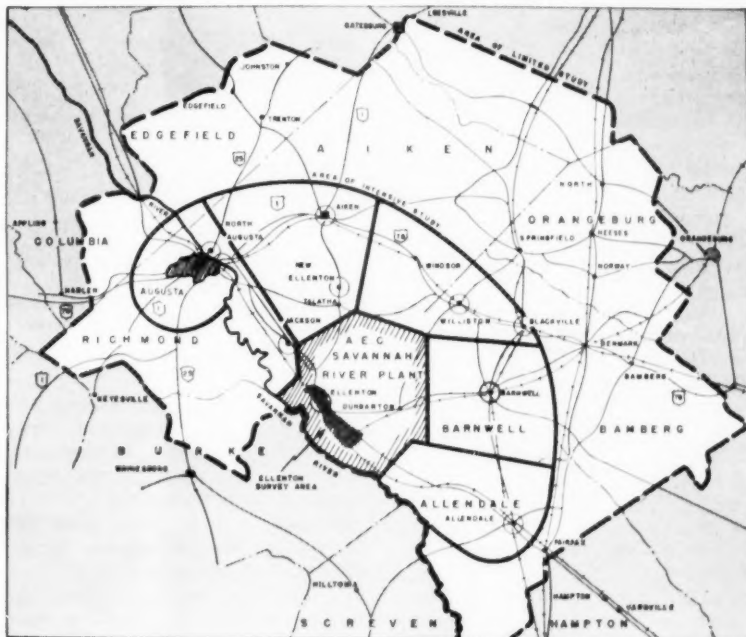
#### PERE F. SEWARD,

Commissioner, Division of Community Facilities and Special Operations, HHFA

sistance made available under a number of existing and new programs. Although the AEC had no legal responsibility to coordinate the activities which eased the

transition, as the agency responsible for the change it was the one to which the people instinctively turned, and the AEC accepted the role of counsellor. It steered requests into proper channels to obtain assistance, directed inquiries to appropriate sources, and, unofficially, served effectively as the coordinating agency.

The displacement of 1500 families in relatively few months symbolized the drastic change this new atomic energy facility was causing in an old and long stabilized section of the nation. The social culture of this Savannah River area was rooted in



● THIS MAP shows the general section affected by the AEC Savannah River plant, the areas of intensive and limited study, and the communities.

the land; the economy that supported it was based largely on corn, cotton, peanuts, and the products of the pine woods; the social relationships were those which evolved through the years from the plantation era. When the largest, most modern production facility developed by the farthest advances of science was located in this area, rapid and inevitable change loomed.

mands upon public facilities. Water, waste disposal and schools presented almost immediate problems.

Moreover, the local governments generally were not organized or prepared to deal with the complexities of urbanization. Activities of local government had been at a minimal level, faced minimal demands, and operated on minimal budgets. Except in the larger cen-

proximately 3,000 of them were on the site by January 1, 1953.

Federal assistance was provided and a program undertaken to expand the supply of housing for families of permanent employees. Some 3,900 units scheduled to be built by private enterprise, with special Federal financing aid, were substantially completed by the first of the year. However, one of the major obstacles to expansion of housing was the lack of essential community facilities, and the expansion of the housing program itself could not proceed more rapidly than these services were provided. To ease this situation, and to facilitate the transition from a rural to an industrial economy, the Federal government, through various programs, made available more than \$20 million by January 1, 1953, for a variety of public works.

The oldest of these, the Second Advance Planning Program for non-Federal public works, was used by Augusta and its satellite towns, Blythe and North Augusta, and also by Aiken, and Barnwell to obtain these interest-free advances from the Housing and Home Finance



● NEW ACCESS highway is carried across US Highway 1, at left, and SC Highway 421, at right. US 1 was rebuilt to carry four lanes of traffic.

Many of the displaced families were tenant farm families. Through the cooperation of county farm agents in the region, all of them who wished had the opportunity to relocate as tenants on farms. In many of the families, however, the men took construction jobs in the building of the new atomic energy plant. From self-sustaining farm economy they transferred temporarily into a job-and-dollar economy. Their eventual adjustment, after the construction is completed, has yet to be worked out.

Aiken, S. C., and Augusta, Ga., were within commuting distance of the site. Except for them there was no town in the area with a 1950 population of more than 3,700. Seven towns were in the 2,500 to 3,700 population group. All the others were smaller, 26 of the 34 surrounding communities having had less than 1,000 population.

### Impact of Change

It was on these smaller communities that the impact of change fell hardest. In them a small increase in numbers of population became a tremendous increase when measured by percentages, and percentage changes gave the more accurate measure of increased de-



● UNDER PUBLIC Law 139, many new facilities were added. This shows a new water treatment plant under construction for North Augusta, So. Car.

ters, such concepts as community planning, zoning, subdivision control, and organized recreational programs and health clinics were foreign to local traditions.

In addition to the problems created by the temporary influx of construction workers, there was also the permanent problem of housing families of operating personnel. AEC estimated that some 7,000 employees would be required for this purpose all together; ap-

Agency with which to make some plans toward meeting the forthcoming problems. Lending authority under this program expired October 13, 1951. Under this program two school districts in Barnwell obtained loans to plan schools, the other communities obtained loans to plan water and sewer facilities.

### Providing Schools

Foremost among the collateral community problems to be solved

in order that the atomic energy installation could proceed on schedule was that of providing schools. In September, 1950, the Congress, in Public Law 815, had authorized Federal assistance to construct public schools in Federally-affected areas. Under this Act, Federal aid in the form of grants, technically known as entitlements, was authorized for free public schools which are attended by children who live on Federal property with a parent employed on Federal property; to such schools which enroll children whose parents work on Federal property but who may live elsewhere; and to such schools attended by children whose attendance results from activities of the United States. These grants are made available to local school districts for permanent construction upon applications filed through the State Departments of Education with the U. S. Office of Education, Federal Security Administration. School construction under this program is supervised by the Community Facilities and Special Operations division of the HHFA. Allocations for construction of temporary

the peak load in 1953 to 18,619.

This additional school load would place an approximate 50 percent increase on the school facilities of the area surrounding the new atomic energy installation, an area in which there were no surplus facilities available.

To meet the immediate demand the Office of Education allocated \$3,471,676 to the HHFA for con-

Recognizing that the demands for a tremendous expansion of community facilities and services, in addition to schools, would be generated in areas like the Savannah River Project, and that the rapid, almost explosive, development would overwhelm the financial capacities of the local governments, the Congress in September, 1951, authorized specific assistance



● **SEWER FACILITIES** also had to be provided. A new sewage treatment plant for North Barnwell, So. Car., is shown here under construction.



● **SANITARY SEWER** interceptor under construction at North Augusta, So. Car. The size of the pipe indicates the amount of contributing population.

school facilities are made directly to the HHFA.

Early estimates of the number of additional school children who would be brought into the area by reason of the construction of the Savannah River AEC installation and the anticipated time schedule were: July, 1952, 12,088; Jan. 1953, 16,496; July, 1953, 17,810. To this must be added the school children displaced by clearance of the atomic installation area, raising

construction of temporary school facilities for 6,139 pupils in North Augusta, Barnwell, Blackville, Wiliston, Allendale, Fairfax, Ellenson, and Aiken, South Carolina, and in Richmond County, Georgia. The Office of Education also allocated \$4,292,772 to provide or assist in providing school facilities for 5,865 pupils in Augusta, Ga.; North Augusta, S.C.; Aiken, S.C.; Barnwell, S.C.; Blackville, S.C.; and Wiliston, S.C.

to supply these facilities in critical defense housing areas. These aids were incorporated in Title III of P.L. 139, "The Defense Housing and Community Facilities and Services Act of 1951."

Most of the Act is administered by the Housing and Home Finance Agency and its constituent agencies. Title III, however, authorizes the HHFA and the Federal Security Agency to extend Federal aid to local communities in critical defense housing areas to build, maintain, and operate community facilities and services to the extent that they cannot be financed locally, or under certain circumstances, to provide them directly.

### Providing Utilities

Community facilities include water works; sewers; sewerage, garbage and refuse disposal facilities; police and fire protection facilities; public sanitary facilities; works for treatment and purification of water; libraries; hospitals and other places for care of the sick; recreational facilities; streets and roads; and day care centers. Community services, generally include maintenance and operation of such facilities. However, due to the volume

(Continued on page 104)

# HOT PLANT MIX

## *is Economical for County Highways*

OUR experiences with plant mixed bituminous concrete spread with a mechanical finisher have shown us that we can build excellent highways at a cost less than we expected and which we can afford. Jefferson County has 385 miles of county roads; 185 miles of state roads which are maintained by the county at state expense; and 600 to 700 miles of roads and streets in our communities. As a result of our work, every mile of state and county road is paved. About half of the county roads are paved with plant mix, laid with a finisher; and the remainder are road mix. The latter are gradually being resurfaced with plant mix.

Our real start in this program of improvement dates back to late 1946, when the county decided to step up both the quantity and the quality of their roadbuilding operations. An asphalt mixing plant and a mechanical finisher, both Barber-Greene, were purchased. Not much work was possible in the next two years, but in 1949 the program of resurfacing the highway system began in earnest, and on a sound ba-

sis. For instance, our aggregates have been tested by the State laboratories and we have followed their recommendations as to gradation and mix design.

Where the paving work is over the original gravel, we place a 2-inch mat with the finisher. This mat consists of aggregate with a  $\frac{3}{4}$ -inch maximum size, bound with either MC-3, MC-4 or MC-5 asphalt, depending on the temperature and other weather factors. In midsummer, we utilize RC-3 or RC-4. Our method of placement is interesting. After the preliminary light blading to grade and to level our bumps or depressions, we sweep the surface and then apply a prime coat of 0.15 gallon of RC-1 asphalt per square yard to the outer four feet only on each side of the road. We have found

that this prevents edge raveling; and it has the added advantage of effecting a considerable saving in time and materials through omitting the prime coat down the center of the road.

When we are resurfacing an existing black-top road, we follow the same general procedure. Most of these roads are 2-inch traffic bound macadam; they are from 18 ft. to 20 ft. wide. We are endeavoring to widen these to 24 ft. by cutting into the shoulder for a depth of about 2 ins., adding gravel, and then resurfacing to the entire 24-ft. width, following the same procedure of prime-coating only the outer four feet on each side. In resurfacing, we hold our aggregate to a maximum size of  $\frac{1}{2}$  inch and place a single mat ranging from  $1\frac{1}{2}$  to  $1\frac{3}{4}$  ins. thick, depending on the traffic carried by the road.

All plant mix pavements are seal coated, using 0.35 gallon of RC-4 asphalt per square yard, covered with crushed pea gravel which passes  $\frac{1}{2}$ -inch and is retained on  $\frac{3}{4}$ -inch screens.

We estimate a 10-year to 12-year

### P. S. BANASZEK

Highway Commissioner,  
Jefferson County, Wisconsin



● DISCUSSING the 1953 Program: L to R are Messrs. Lechinsky, Woelffer, Banaszek, Weggeman and Davis.



● PART OF the 30 miles of resurfacing and 20 miles of patching which the County will do in 1953.



TABLE 1—COST OF CONSTRUCTING 2.45 MILES OF ROAD MIX SURFACE

<b>Producing Gravel:</b>				<b>Supply trucks, 29 hrs. at \$2.05</b> .....				59.45
Labor, 84 hours at \$1.715	\$144.06			Distributor trucks, 44 hrs. at \$2.05	90.20			
Labor, incidental, 13.53 percent	19.49	\$163.55		Distributor, 44 hrs. at \$3.40	149.60	299.25		
Transportation car, 6 hours at .50	3.00			Asphalt, 37,673 gals.		3,845.65		
Crushing, 1250 cu. yds. at .40	500.00							
Aggregate cost, 1250 Yds. at .10	125.00	628.00						
				<b>Total, asphalt and distribution</b> .....		4,433.61		
<b>Gravel production</b> .....				<b>Shaping and Mixing:</b>				
		791.55		Labor, 46½ hrs. at \$1.58	73.47			
<b>Hauling &amp; placing Gravel—12-Mile Haul:</b>				" , 99½ hrs. at \$1.68	167.16			
Labor, 384½ hrs. at \$1.50	576.75			" , 6½ hrs. at \$1.78	11.57			
" , incidental, 13.53 percent	78.03	654.78		" , incidental, 13.53 percent	34.12	286.32		
Trucks: 19 hrs. at \$2.05	38.95			Motor graders, 103 hrs. at \$3.80	391.40			
59 hrs. at \$2.45	144.55			Pulvimixer, 22½ hrs. at \$4.20	94.50	485.90		
88 hrs. at \$3.55	312.40							
115 hrs. at \$4.00	460.00	955.90		<b>Total shaping and mixing</b> .....		772.22		
				<b>Rolling:</b>				
<b>Total hauling &amp; placing</b> .....	1,610.68			Labor, 27 hrs. at \$1.58	42.66			
<b>Level and Dry-Cut Gravel:</b>				" , incidental, 13.53 percent	5.77	48.43		
Labor, 10 hrs. at \$1.50	15.00			Roller, 15 hrs. at \$1.90	28.50			
" , 21 hrs. at \$1.58	33.18			" , 9½ hrs. at \$2.30	21.85	50.35		
" , incidental, 13.53 percent	6.52	54.70						
Rental of motor grader, 25 hrs. at \$2.35		58.75		<b>Total rolling</b> .....		98.78		
				<b>Moving Costs:</b>				
<b>Total, level and dry-cut</b> .....	113.45			Labor, 21 hrs. at \$1.50	31.50			
<b>Application of Asphalt:</b>				" , incidental, 13.53 percent	4.26	35.76		
Labor, 50 hrs. at \$1.50	75.00			Truck and trailer, 9 hrs. at \$10.90		98.10		
" , 55 hrs. at \$1.64	90.20							
" , 55 hrs. at \$1.68	92.40			<b>Total moving costs</b> .....		133.86		
" , incidental, 13.53 percent	34.41	288.71		<b>Total cost of job</b> .....		\$7,954.15		
				<b>Average cost per mile</b> .....		\$3,246.59		

life expectancy for our roads surfaced with the 2-inch layer of plant-mix and then seal coated as described. We are planning our seal coating operations so that approximately 20 percent of our total road system is covered annually. By following this program, every mile of the county road system will be seal coated every five years.

During the years that we have used the Barber-Greene plant, we have pretty well systematized operations, and we have been fortunate in being able to keep the same plant crew. This has very definitely helped us to reduce costs. It has also helped us to make our plant an extremely portable one, despite its size. We usually move our plant at least

twice each year in order to minimize hauls and take maximum advantage of our aggregate supplies. Moving this equipment may seem to be quite an undertaking, but its portability and the experience of our men make our moving-day problems easy ones. It is normal for us to take only two and a half days to make a move; and on one occa-



● THIS IS Jefferson County's asphalt plant set up for operation for 1953. Plant flow is from right to left. Shovel at extreme right feeds hopper; dryer discharges to mixer for discharge to trucks.

sion, of which we are rightfully proud, we shut down at noon in one location, moved across the county, and were back in operation by noon the following day—exactly 24 hours later.

Practically all of our equipment is mounted on rubber tires. It includes: one Barber-Greene Model 848 mixer; one Barber-Greene Model 837 dryer; one Barber-Greene 60-ft. portable conveyor, Style N; one Cleaver-Brooks 125-hp boiler; one 800-gallon fuel oil trailer; one 15,000-gal. asphalt tank trailer; one ¾-yd. Lima shovel; a Galion 8-12-ton roller; a Hough front end broom mounted on an International wheel tractor; a Rosco distributor; and other miscellaneous equipment. To service the crews using this equipment, we use from 10 to 12 county trucks and hire additional ones as needed, depending on the distance from the plant to the finisher.

Some additional points about plant operation are worthy of mention. We have standardized on No. 2 fuel oil for our dryer burner, inasmuch as it is used in the boiler and for a variety of other purposes. A fuel truck, which shuttles between our main shop and our four outlying shops and garages, calls at the asphalt plant twice daily, keeping our fuel supply constantly replenished.

Our plant and finisher crews regu-

larly comprise only eight men. Each of these men maintains his own portion of the equipment; and I feel that this has resulted in a greater feeling of responsibility on the part of each. The crews are: At the mixing plant, a mixer operator, a dryer operator, a boiler operator, a shovel runner and a bulldozer operator, a total of five. At the finisher, there is the operator, the screed man and one helper. All of the eight have been with us for several years and know their jobs thoroughly. We normally work a 9-hour day, from 7 am to 5:30 pm.

This year we are adding a Barber-Greene dust collector to our plant. This unit is also mounted on rubber tires so it will fit in with our overall scheme of portability. There are several good reasons for buying this dust collector. The most obvious, although not in my opinion the most important, is the minimization of dust in the plant vicinity. Using a dust collector cuts down very materially on the maintenance of engines, bearings and other moving parts. Of even greater importance is the conservation of the fines in the aggregate. In its natural state, our aggregate contains from 4 to 5 percent of material passing a 200-mesh sieve. If this material is blown out through the dryer stack during operation, it must be replaced by adding agricultural lime or other mineral filler to the mix. While we can

procure such filler at a low cost, handling and transporting it costs money. I figure that every yard of raw aggregate that we use costs us \$1.12. Blowing five percent of this out of the stack (without considering the cost of drying it) makes me see a stream of nickels disappearing into the air. In 1950, we dried more than 34,000 tons of aggregates; we also blew about \$1700 worth of fines out of the stack while doing it. I figure that the dust collector will pay for itself through the salvaged fines alone; and it will also reduce boiler horsepower requirements through more efficient dryer operations.

If I were to draw a single conclusion from our experiences of the past four years, it would be that we can produce and lay hot plant mix asphaltic material with a finisher at a cost per mile which compares very favorably with the cost of road mix. Our figures indicate that the per mile cost of roads paved with the finisher, using hot plant mix, runs from a low of \$2900 to a high of \$3600. The greatest variable is in the length of haul involved. For jobs of comparable size we have found that blade mixing costs us from a low of \$3300 to a high of \$3700 per mile. Cost data on two comparable jobs are given in Table 1 for road mix and Table 2 for plant mix.

(Continued on page 104)

TABLE 2—COST OF CONSTRUCTING 3.6 MILES OF PLANT MIX SURFACING

Labor, Equipment and Materials at Pit:				Paver Operation:			
Foreman, pug mill, 54 hrs. at \$1.65	89.10			Paver operator, 81½ hrs. at \$1.65	134.48		
Dryer operator, 54 hrs. at \$1.55	83.70			Paver helper, 81½ hrs. at \$1.55	126.33		
Boiler operator, 54 hrs. at \$1.47	79.38			" " , 81½ hrs. at \$1.47	119.81		
Dozer operator, 54 hrs. at \$1.65	89.10			Labor, incidental, 13.53 percent	51.50	432.12	
Shovel operator, 54 hrs. at \$1.91	103.14			Bituminous paver, 1827.4 yds. at .11	201.02		
Truck drivers, 110 hrs. at \$1.47	161.70						
Labor, incidental, 13.53 percent	82.01	688.13		Total paver operation		633.14	
Mixing plant, 1827.4 yds. at .80	1,461.92						
Power shovel, 37 hrs. at \$5.20	199.80			Roller Operation:			
Tractor-dozzer, 33 hrs. at \$6.45	212.85			Labor, 66½ hrs. at \$1.55	103.08		
Conveyor, 36 hrs. at .70	25.20			" , incidental, 13.53 percent	13.95	117.03	
Water pump, 12 hrs. at \$1.05	12.60			Roller, 51 hrs. at \$1.90	96.90		
Transportation car, 15 hrs. at .50	7.50			Total rolling		213.93	
Supply trucks, 80 hrs. at \$2.05	164.00	2,083.87					
1827.4 cu. yds. gravel at \$1.12	2,046.69			Moving Machinery:			
35475 gals. bitumen	4,086.27	6,132.96		Labor, 6 hrs. at \$1.47	8.82		
Total manufacture of mix		8,904.96		" , incidental, 13.53 percent	1.19	10.01	
Hauling to Job; Average Haul 4.5 miles:				Truck, 1 hr. at \$2.80	2.80		
Truck drivers, 394 hrs. at \$1.47	579.18			" , 2 hrs. at \$3.55	7.10		
Labor, incidental, 13.53 percent	78.36	657.54		Trailer, 2 hrs. at \$5.70	11.40		
Trucks, 18 hrs. at .50	9.00			" , 1 hr. at \$3.80	3.80	25.10	
" 284 hrs. at \$2.05	582.20			Total moving machinery		35.11	
" 81 hrs. at \$3.55	287.55	878.75		Supervision costs		56.62	
Total hauling to job		1,536.29		Total cost of job		\$11,380.10	
				Average cost per mile		\$3,161.14	



● AIR VIEW of city shows parking, traffic and other details of value in planning.

## MESA AIR MAPS Prove Invaluable Tools

DEAN SMITH

**B**ECAUSE the city of Mesa, Arizona, had an unusual problem—660 x 660-foot blocks in the square mile that comprises its heart—City Engineer Tom Nesbitt now has a valuable new tool that serves him well in a dozen different phases of his work. That tool is an aerial map of about two square miles of Mesa, and its total cost was only \$390.

Here's how it came about: Mesa, which was founded in 1878 by Mormon pioneers from Salt Lake City, was laid out by those pioneers as a square area with eight of the huge 660 x 660 blocks to the mile. That arrangement was ideal for the founders, who wanted room for a rambling house and a cow pasture on each lot. But when the city became more urbanized, the big blocks presented a huge headache. Homes or stores were built on the perimeter of each block facing the streets, but the vast areas in the middle of each block became worthless and many degraded into weed patches and trash dumps.

That's why Nesbitt persuaded the Mesa City Council to authorize air mapping of the city's heart—to obtain accurate pictures of the situation in the middle of each block.

The city needs to know that in order to plan for parking areas in the middle of some blocks and the placing of streets midway through others. To make a similar survey from the surface would have required many weeks of work, and the cost would have been very high.

The Southwest Aero Survey Co. of Phoenix was awarded the contract for the work, which was done in December, 1951. The company provided 70 different 9 x 9 photographs, made to a scale of 1 in.: 200 ft., plus a mosaic of the entire area covered by the survey. The mosaic was mounted on masonite for easy handling, and the city has divided it into four quarters for easier reference.

Nesbitt has found the air maps valuable for their original purpose, but he has also been amazed to learn how many other ways the photos can be used by the city.

Here are some of the other ways in which Mesa is using them:

**Street location and design, including alleys.**—When the city plans a street or alley through a block, one of the first things now consulted is the air map. It shows in minute detail the property involved, the width between houses, and the use of the land between existing streets.

On several occasions the maps have proved useful in making de-

cisions on the validity of requests made by sub-dividers regarding streets and alleys. One man recently presented a plan for running a new street through a block near the center of the city, declaring that there was sufficient clearance for the right of way between all existing buildings. But five minutes with the air map showed him that such was not the case. Without the map, a city crew would have spent half a day surveying it.

**Property assessments.**—Mesa is a growing city and several improvement districts are always in progress at any given time. When the time comes to assess the property owners involved in a street or sewer district, the air maps come in handy for determining the frontages of each owner. The photos would be equally valuable in tax equalization work, but Mesa does not have a municipal tax.

**Zoning and planning.**—This is one of the most common uses of the air maps. In fact, they replace the land use maps formerly used by the city to determine zoning of each area. In addition to showing whether any area is used for residences, business, or industry, the photos show exactly what type of installation is in use.

Photos of newly developed or growing areas can be invaluable  
(Continued on page 64)



● NEWLY completed plant. Water tank is shown at top, plant units below. Clean-up not yet completed.

# SEWAGE TREATMENT

J. L. MORRISON,

School of Journalism,  
University of North Carolina

"PAY-as-you-go" is the ideal which most municipal public works supervisors dream about but seldom see. This matter of financing a public works project out of current income without encumbering future revenue—which to some sounds like eating your cake and having it too—is a matter of record, however, in the case of the new sewage disposal system of Burlington, N. C.

This new \$452,000 facility was financed without a bond issue, according to City Manager E. C. Brandon, Jr., but instead by a 50 percent service charge based on each water bill. At the end of February, 1953, the 50 percent charge was reduced to 25 percent where it now remains for the purpose of producing some \$60,000 a year.

Of this amount, \$20,000 is being earmarked for operation and maintenance of the new disposal system and \$40,000 will be put aside each year for the next 10 years. The set-aside \$400,000 will then be used, Mr. Brandon points out, to build Burlington another sewage disposal plant and thus keep the city's sanitation program moving along in a progressive manner.

When the sewage disposal plant began operating in early March, 1953, Burlington found itself with a paid-for plant which handles 2 mgpd with a designed capacity of

6 mgpd, this latter having been anticipated by the designers, William C. Olsen Engineers of Raleigh, N. C., who made provisions for the additions. Furthermore, when the 50 percent sewer service charge was reduced at the end of February, 1953, enough money was on hand to provide \$14,000 for additional construction and thereby to leave the way open for easy expansion of the system.

## Selling the Idea

How was it possible to win public approval for so high an impost as the 50 percent sewer service charge in a city which had never before had such a surcharge? City Manager Brandon explains that he set out to win the co-operation of the largest water customers as a first and indispensable step. Because Burlington is a heavily industrialized municipality, thickly populated with hosiery and textile mills, there is a characteristic industrial pattern to the problem of waste and its disposal.

It was Mr. Brandon's reasoning that industrialists like to be given a plan with several alternative courses of action—the same sort of staff work they are accustomed to getting from their own junior executives. Accordingly, he approached the City-County Chamber of Commerce's Planning Committee, made up of the city's biggest water customers, with a plan which offered three alternatives. These were: (1) a \$400,000 bond issue, (2) a small sewer service charge, and (3) a large sewer service charge to be de-

creased upon completion of the project.

Nor did Mr. Brandon neglect to secure in those last days of 1950 the backing, by way of a personal appearance before the committee, of Earl C. Hubbard, Principal Sanitary Engineer of the North Carolina State Board of Health. Mr. Hubbard discussed the urgency of the construction of the sewage disposal plant.

In listing the drawbacks of a \$400,000 bond issue, City Manager Brandon pointed out that (1) it would have to be submitted to a vote of the people for approval, (2) such a means of financing merely places the burden of payment upon future revenues rather than those of the present, and (3) the city would spend anywhere from \$55,000 to \$205,000 in interest from funds collected from the people and from which funds there would be no direct return.

An accompanying mimeographed summation made this latter point more graphic by the following table:

Interest Charges Depending Upon the Maturity Date of the Bonds		
10 Years	.....	\$55,000
20 Years	.....	105,000
30 Years	.....	142,000
40 Years	.....	205,000

In demolishing the second of the three alternatives, that of imposing a small sewer service charge, Mr.



Brandon simply pointed out that placing such monies in a special fund would serve to postpone the vital project from two to five years depending upon the size of the charge. As if to give this suggestion its final quietus, he indicated that the only additional expense to the city would come from settling claims of property owners along Little Alamance Creek. This made Mr. Brandon's auditors somewhat restive, he recalls with a smile, since pollution suits are not budgeted city items and the assembled industrialists knew it.

To this item of lawsuits alleging pollution should be added this footnote. An earlier bond issue in Burlington, which had provided a water treatment plant and land for a pro-

Mr. Brandon also helped along this third alternative by showing, via another table, the various total sums which would be available at the end of the construction period by collecting the various charges during the 15-month construction period. Keeping constant the figures of \$72,000 on hand and a \$47,000 budget appropriation, he points out:

Charge	15-Month Yield
65 percent .....	\$187,600
50 percent .....	144,400
33 1/3 percent .....	92,200
25 percent .....	72,200

their way to charge off economically such added municipal imposts as this sewage treatment levy.

### Treatment Results

Burlington's new plant will remove 95 to 99 percent of the impurities in the city's waste. The sensitive factor, however, as Mr. Brandon points out, is the question of Burlington's industries making no marked changes in their waste discharges. A revised textile dye formula, for instance, could play havoc with the new system and accordingly the next item on the agenda—a particularly ticklish one—probably will have to be some form of waste control legislation. City Manager Brandon is hoping he can "sell" that program as successfully as the pay-

## on PAY-AS-YOU-GO BASIS

jected sewage disposal plant, also provided additional outfall lines to carry the city's sewage well beyond the city limits into Little Alamance Creek. That useful bond issue was sparked by the then city manager—W. H. Carper, now city manager of Raleigh, N. C.—who did much creditable groundwork setting the stage for Burlington's pay-as-you-go attitude towards public works.

As a result of the new outfalls, however, City Manager Brandon points out that the complaints from inside the city limits were now transferred to the new site. It happened, too, that property owners at the new site were more vocal in their objections and provided some useful prodding of the city authorities.

Mr. Brandon's third alternative—the desirable one which was finally adopted—was rightfully portrayed as the only one by which Burlington could get quick action on the vital project. To this, of course, were added the avoidance of the pitfalls which were inherent in the other two proposals.

Based on water sales of \$231,000 a year, a table of amounts collected under various charges were quickly forthcoming:

Charge	Annual Yield
65 percent .....	\$150,150
50 percent .....	115,500
33 1/3 percent .....	77,000
25 percent .....	57,750

With these figures, therefore, the city authorities could see that to build a complete plant at once—which would be more economical than requiring a contractor to move his equipment from the site and return later to complete a secondary treatment stage—the impost would have to be in effect for many additional months at the 50 percent charge they desired.

### 50 Per Cent Charge Imposed for 26 Months

As matters turned out, the 50 percent charge was imposed over a period of 26 months.

As the outcome of City Manager Brandon's thoughtful presentation, the Chamber of Commerce Committee passed a resolution calling for adoption of the third, or pay-as-you-go alternative, and memorialized the City Council to that effect. The City Council waited a reasonable period so that public sentiment could crystallize on the matter, and then passed the enabling legislation without a murmur.

Citing factors which helped put over the pay-as-you-go plan with Burlington industrialists, Mr. Brandon lists: (1) other cities already had imposed sewer service charges, setting a pattern for Burlington which had not yet done so; (2) there was the menace of a higher tax rate by reason of the mounting number of pollution lawsuits; (3) the plan would leave the city with no indebtedness; and (4) when business is good and excess profits taxes are heavy, corporations can see

as-you-go sewage disposal system was sold to the voters.

That system itself, as has been said, operates to treat 2 mgpd and is readily expandable to 6 mgpd. At the pump house are 2 raw sewage pumps by De Laval, one a 1050 gpm, 15 hp, 870 rpm pump, with pump suction size of 6 inch and pump discharge size of 5 inch; the other a 2450 gpm, 30 hp, 870 rpm pump, with pump suction size of 8 inch and pump discharge size of 6 inch. The recirculating pump is by Yeomans with a capacity of 600 gpm against 29 ft. TDH at 1150 rpm. The sludge pump is by Marlow and is powered by a 3 hp motor. The raw water meter is by Builders Iron Foundry, using Kennison nozzles.

Flocculating equipment and sludge collectors in both primary and secondary clarifiers were furnished by Chain Belt Co. Chlorination equipment at the terminus of the secondary clarifier is by Wallace & Tiernan. The rotary distributor is by Pacific Flush Tank Co. Major items of equipment in the digester are also by PFT, specifically the floating cover, the digester heater, the heat exchanger, and the supernatant selector. The trash pump is by Fairbanks-Morse and is a 3 hp, 150 gpm, 4 by 4 pump operating at 850 rpm. Pump controls are by Automatic Control Co. and gas meters by Rockwell Manufacturing Co.

The plant supervisor is York Brannock, whose immediate superior is W. W. Adkins, Burlington's superintendent of utilities.

# OHIO WATER CLINIC REPORTS:

## Development of an Industrial Water System

ROBERT C. LEWIS

**T**HIS is a report of the development of the Southwestern Ohio Water Company formed by eleven Millcreek Valley industries to de-

velop a ground-water supply for industrial purposes.

A great amount of study, prospecting, negotiating and planning

preceded 1949 at which time it was decided that the Big Bend area of the Miami River was the most satisfactory site for a well field. Water is now pumped from this well field at elevation 480 over a summit at elevation 960, thence by gravity across two major stream valleys to a 15-mg reservoir at maximum water surface elevation 615 ft. From the reservoir water is distributed by gravity to each of the participating industries.

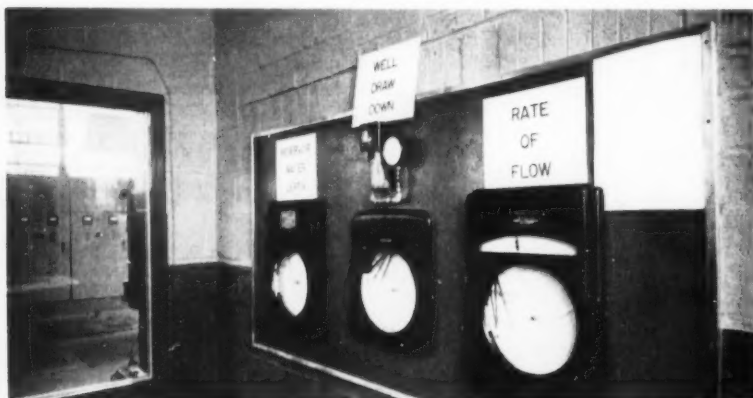
Ranney collector wells were used because they appeared to be best adapted to remove water from the 140-foot deep gravel aquifer for the following reasons: (1)—Lower initial cost; (2)—concentration of operation and maintenance operations; (3)—means of some temperature control; and (4)—opportunity to observe and inspect pumps.

A 20-foot diameter concrete caisson was sunk to bedrock and sealed off with concrete plugs. Then slotted screen pipes totalling 2,800 ft. in length were driven radially, horizontally at elevations minus 100 and minus 124 feet relative to the ground surface. Nine stage vertical turbine pumps for 550-ft. operating head were installed.

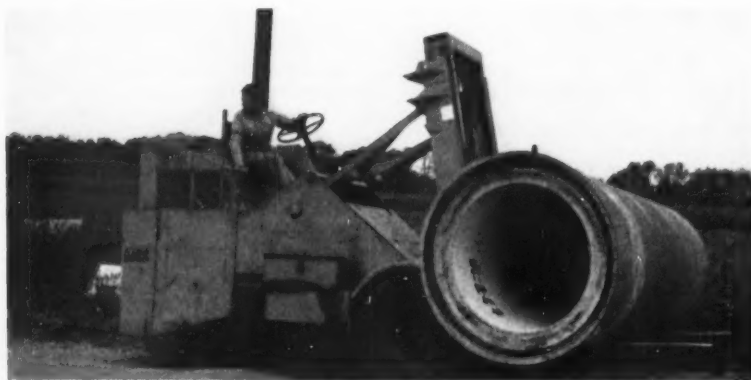
A rather complex system of valves and controls was installed to facilitate satisfactory pump operation and to prevent damage in case of power failure.

Prestressed concrete pipe was used for the supply and distribution mains except for an 80-ft. section under the proposed West Fork Lake. The 15-mg reservoir was purchased from the City of Hamilton. Water is brought into the reservoir at the bottom and provisions for bypassing and cleaning are installed.

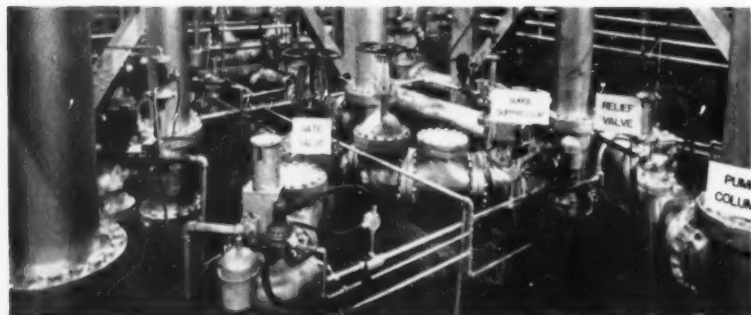
Each industry receives its water through cast iron distributor mains equipped with venturi type rate controllers set to provide a maximum rate  $2\frac{1}{2}$  times the average rate for the given industry. Water pumpage from the well field is correlated with reservoir surface elevation, which is constantly recorded, and with demands so that pumpage is as uniform as possible.



● UNIFORMITY of pumpage is obtained by complete instrumentation.



● PRESTRESSED concrete pipe was used for supply and distribution.



● COMPLETE system of valves and controls facilitates pump operation.

## Research on Industrial Wastes as Related to Water Quality

C. C. RUCHHOFT

**A** BAD tasting or smelling water is one of poor quality, even though it may be bacteriologically safe. It is known that water having unpleasant taste or odor causes people to go to other sources, often unprotected ones, and may reduce water intake below a healthy level.

Water tastes and odors are principally due to (1) phenolic wastes; (2) hydrocarbon or petroleum wastes; (3) miscellaneous chemical wastes; and (4) wastes from processing biological materials or biological processes.

There are almost no specific sensitive analytical tests for low concentrations of most of the large number of organic compounds that may be responsible for taste and odor in water supplies. One study indicated that certain synthetic organic chemical taste and odor producing effluents are more difficult to treat biologically than sewage and that they are more persistent in

streams. Present analysis parameters for stream pollution work are frequently inadequate.

Future taste and odor stream survey studies should include:

1. The new concentration and chemical separation techniques should be used to isolate and separate the chemical groups of compounds, and identify the critical taste and odor producing constituents in wastes from the important industries that are involved.

2. Sensitive methods of analysis for the detection and determination of the concentrations of such specific critical constituents with high threshold odor values must be developed.

3. Studies to determine the persistence of these critical taste and odor producing constituents in surface waters should be made.

4. Methods for removing such critical constituents below taste threshold values at the source and at water purification plants must be developed.

## How Industry Makes a Waste Survey

J. E. COOPER

**W**ASTE surveys are of two types, those made by the staff of the industry and those made by a Governmental regulatory agency. The survey should not only focus attention on the measurement of waste volume and strength but also on the internal industrial processes which are potential threats to pollution.

The survey should be well organized at the beginning with special consideration to each of the following points: (1) The use of facts learned; (2) whether or not the survey shall include just the wastes themselves or shall also include their effects on the receiving waters; (3) whether or not results of the study will be used by outside organizations; and (4) availability of trained personnel and special equipment.

It might even be desirable to run a preliminary survey to get the feeling of the situation and to invite the regulatory agency to participate in the survey. When the results

of a survey are the basis of design for waste treatment facility the consulting engineers on the design should be participants in the planning of the waste survey.

The actual survey should include the following important points: (1)

The plant study; (2) measurement of waste flows; (3) sample analyses; and (4) report of findings.

The plant study traces through the industrial processes all materials which might ultimately show up as liquid wastes and logically begins in the purchasing department with a careful follow-up through stock and use departments. Flow measurements involve using the applied hydraulics necessary to meet local conditions with a considerable amount of ingenuity. Maximum and total flows should be measured and all data correlated to the "shift" on duty. Both composite and grab samples need to be taken, the former will show total amount and average while the individual grab samples will show the variation in strength of wastes relative to time. Sampling equipment is available in many forms but the proper selection must be made for the problem at hand.

Many industries maintain product control laboratories but these will have to expand if water and waste analyses are to be run. Frequently new waste laboratories are set up, staffed and equipped for the special work of analysis of water and wastes.

Reporting the findings involves presenting all the data in neat, logical form with interpretation and evaluation as needed. Interpretation involves study of concentration of wastes found; comparison of findings with established standards of water quality; calculating waste in terms of quantity per production unit; study of lethal limits in receiving waters; and expression of total waste load in terms of population equivalent.

## Increasing Water Resources Through Cloud Seeding

IRVING P. KRICK

**D**URING periods of natural storminess man is able to assist nature to give up a portion of the almost endless supply of moisture by several methods. If the artificial stimulus increases the precipitation efficiency 5 percent it will have doubled the total rain from a given cloud formation.

After experiments by the Dutch and by General Electric Co., the author and members of the California Institute of Technology continued work to develop cloud seed-

ing. Cloud seeding from airplanes was costly and ineffective so ground generators were developed.

The author and others organized the Water Resources Development Corporation in 1950 to undertake commercial cloud seeding operations. In June 1950 this corporation had 100,000 acres in Washington under contract and seeding operations were so successful that a greatly increased area was under contract one year later.

Nature precipitates water from the skies in two stages—the first  
(Continued on page 94)







● ROLLING bituminous concrete placed over the old roadway surfacing.



● TYPICAL stationary plant is used for producing the bituminous mixture.



● RESURFACING old cement concrete pavement with bituminous concrete.

## HOW to Design a Bituminous Concrete Mixture With Graded Aggregates

J. E. MYERS

THE laboratory and field service tests which have been conducted on bituminous concretes by the Corps of Engineers, Department of the Army, and other investigators, seem to agree that the gradation of aggregates which reduces the aggregate voids to a minimum possesses the highest structural strength or stability as determined by the Hubbard-Field or the Marshall stability testing machines or by road service tests.

Mathematical formulas have been developed by which the gradation of the aggregates, starting with a given top size, may be calculated which will give the maximum density (least voids) that may be obtained by grading the aggregates from the given top size to minus 200 mesh material. By the use of these formulas a gradation curve for the aggregates may be determined and plotted. These formulas are commonly known as the Furnas formula, the Talbot formula and the Fuller formula. Furnas, Talbot and Fuller are the names of the men who originated the formulas.

The formulas are not exactly alike, so the calculated gradation results differ to a slight, but unimportant, degree. If the gradation results, as calculated by any of the above mentioned formulas, are compared with the aggregate gradation which gives the maximum stability results, as determined by the stability test (Marshall or Hubbard-Field) it will be found that the

calculated gradation results and the maximum stability gradation results agree. Hence the desirable gradation of the aggregates for a bituminous concrete mixture may be either calculated or determined by a satisfactory stability test. By either method of gradation determination (calculation or stability test) it will be found that the gradation will comply with the "Gradation of Total Aggregates" as given in ASTM Tentative Specification D947-49T. The gradation of the aggregate for a bituminous concrete surface course with a maximum  $\frac{1}{2}$ -inch size will be as shown in Table I.

Table 1—Surface Course  
Aggregate Gradation

Sieve size	Percent passing
$\frac{3}{4}$ -in.	100
$\frac{1}{2}$ -in.	95-100
No. 4	50-70
No. 8	30-50
No. 50	5-25
No. 200	2-10

The percent of voids that exists in compacted crushed aggregates that have been graded to their maximum density is a slightly variable quantity and depends to some extent upon the degree of compaction to which the graded aggregates have been subjected.

This discussion is confined to aggregate having a maximum size of  $\frac{1}{2}$ -inch, which is a commonly used size for bituminous concrete paving surface courses.

Laboratory examination of numerous samples of bituminous concrete surface courses that have been taken from heavily traveled highways, after a year or more of service, indicate that the total voids in the properly graded aggregates have been reduced to approximately 18 percent. Part of these voids are occupied by the asphalt binder.

It is generally accepted by engineers familiar with the design of bituminous concrete pavements that the percent of voids in the consolidated total mix (aggregates plus asphalt cement) should be between 2 and 5 percent. Such a percentage of voids is necessary in order to allow space for the expansion of the asphalt cement in hot weather. This prevents a "slick" pavement caused by an excess of asphalt cement forced to the surface of the pavement.

Since there are approximately 18 percent of voids in the consolidated aggregates and it is desirable to have approximately 3 percent of voids not filled with asphalt cement, there are 15 percent of voids in the aggregate to be filled with asphalt cement.

### Calculations for AC

If one cubic foot is used as a unit of measurement, the calculations for

the amount of asphalt cement to be used in the bituminous concrete mixture may be made as follows: There are 1728 cubic inches in one cubic foot; 15 percent of 1728 is 260. So 260 cubic inches of asphalt cement are required per cubic foot of consolidated graded aggregate.

There are 231 cubic inches in one gallon, so 260 cubic inches ( $260 \div 231$ ) are equal to 1.12 gallons; thus 1.12 gallons of asphalt are required for one cubic foot of graded aggregate. Since one gallon of asphalt cement weighs approximately 8.5 pounds, 1.12 gallons of asphalt weighs 9.6 pounds ( $8.5 \times 1.12 = 9.6$ ), or 9.6 pounds of asphalt cement are required for one cubic foot of consolidated graded aggregate. This amount of asphalt cement would be required with any type of normal, non-porous, properly graded aggregate.

Since it has been determined that there are 18 percent of voids in consolidated graded aggregate there must be 82 percent of solid aggregate in the cubic foot unit ( $100\% - 18\% = 82\%$ ).

If it is assumed that the specific gravity of the aggregate is 2.73, which is the approximate average specific gravity for limestone or dolomite, one cubic foot of solid aggregate would weigh 170.0 pounds ( $2.73 \text{ sp. gr. of aggregate} \times 62.4 \text{ lbs. wt. per cu. ft. of water} = 170.0 \text{ lbs.}$ ).

Since the solid aggregate in one cubic foot of the consolidated graded aggregate is 82 percent, the weight of the consolidated graded aggregate would be 139.0 pounds ( $82\%$  of 170.0 lbs. = 139.0 pounds).

These computations show that the cubic foot unit of consolidated bituminous concrete consisted of 9.6 pounds of asphalt cement and 139.0 pounds of aggregate or a total unit weight of 148.6 pounds per cubic foot. Of this total weight of 148.6 pounds 6.5 percent is asphalt cement and 93.5 percent is aggregate.

Based on this same reasoning a rather simple formula can be derived for determining the percent of asphalt cement required for other top sizes of aggregate. The aggregate must be graded so as to have maximum density. On the basis of one cubic foot of mix the formula is derived as follows:

Let V be the percent of voids in compacted graded aggregate; A the percent of voids left unfilled to provide for the expansion of the asphalt cement; S the specific gravity of the aggregate; and P the percent of asphalt by weight.

The following constants are also

used: 1 cubic foot equals 1728 cubic inches; 1 gallon equals 231 cubic inches; 1 gallon of asphalt cement weighs 8.5 pounds; and one cubic foot of water weighs 62.4 pounds.

The volume of asphalt required in cubic inches is  $1728 (V - A) / 100$ . The volume of asphalt in gallons is  $1728 (V - A) / 231 \times 100$ , or  $0.075 (V - A)$ . The weight of asphalt in pounds is  $0.075 (V - A) \times 8.5$ , or  $0.64 (V - A)$ . The percent of solid aggregate in the mix is  $100 - V$ . The weight of the aggregate in pounds is  $(100 - V) \times S \times 62.4 / 100$ , or  $0.624 S (100 - V)$ . Then P, the percent of asphalt by weight is the weight of the asphalt divided by the weight of the aggregate plus the weight of the asphalt, that is,  $0.64 (V - A) \times 100$  divided by the sum of  $0.624 \times S (100 - V)$  and  $0.64 (V - A)$ . Substituting the values previously used, that is,  $V = 18$ ,  $A = 3$  and  $S = 2.73$ ,  $P = 960 / 148.6$ , or 6.5.

This void method of calculating the proper amount of asphalt to use in making asphaltic concrete can be used only if the aggregate is graded to have minimum voids. Use of the method with open graded aggregates will give results which are too high.

• • •

## Mesa Air Maps

(Continued from page 57)

in city planning, Nesbitt believes. Their increased use in planning studies can prevent the non-coordinated laying out of streets and residential areas that has plagued Mesa and other cities.

**Public relations.**—A hundred times a day Mesa citizens come to the City Hall to seek information, register complaints, and present problems. Many of these cases require reference to maps or charts, and city officials have found that the layman finds the aerial photos much easier to understand than an ordinary map.

**Industrial location.**—Like every city, Mesa has a problem in finding room for industrial expansion. The aerial maps show at a glance which areas are available for such expansion and adjacent to railroad spurs, warehouse facilities, etc.

Although they haven't had occasion to do so yet, Mesa officials see other uses for the aerial pictures. They may be used for slum clearance studies, since they show blight areas. They can be used by fire and police departments for the de-

termination of locations for public safety facilities. Still another use is that of locating the most efficient routes for garbage and other city services.

An unexpected bit of information revealed by the photos was that of parking concentrations. The pictures were made just before Christmas, when traffic and parking congestion was at its peak, and they show clearly what streets are the most heavily parked. This information has proven valuable in locating proposed downtown parking areas.

Coyd Yost of Southwest Aero Survey who did most of the work on the Mesa job, believes that aerial maps will come into much more common use by officials of smaller cities. Several other Arizona cities are planning aerial surveys within the near future. Mr. Yost says the Mesa job took only about two hours actual flying time, with pilot and photographer, but the preliminary preparations, film processing, and fitting together of the mosaic required several weeks. He used a four-place Stinson plane on the job and shot his pictures with a 12-inch focal length camera. Pre-flight calculations showed that if the pictures were taken from 2,400 feet the negatives would be the exact size necessary to produce contact prints with a scale of 200 ft. to 1 in.

Because of the overlap feature, every point in the pictured area is shown on two different photos. By using a device patterned after the old-time stereoscope, a viewer may look at two of the photos simultaneously and achieve a three-dimensional effect that sometimes helps in the solution of map-reading problems.

The problem of obtaining ground controls—check points for determining distances shown on a photo map—is not a difficult one in city work. Since every picture shows familiar areas, and since block lengths are known, the map reader may make accurate determinations of distances on the photo.

Mr. Nesbitt has only one complaint regarding the Mesa air maps: He wishes he had photos of a wider area of the city. Mesa is planning to take care of that immediately, however, by contracting for the photographing of the remaining portions. Nesbitt says he wants nine square miles photographed, which will give him aerial maps of the entire city and some areas adjoining the city limits. That job is expected to be completed before the end of this summer.

# WASTE TREATMENT METHODS and ECONOMIES

RANDOLPH L. SMITH and

ROBERT J. ELLISON

Consulting Sanitary Engineers

IN waste treatment design it is customary to make a calculation of the theoretical amount of dissolved oxygen available in the diluting water at the effluent point and, using this figure, to determine the degree of treatment needed. This procedure predisposes the right of an industry or municipality to use the diluting water for the purpose of treating sewage—a theory taught in universities, practiced by state departments and used generally as the basis of treatment plant design. Actually the industry or municipality has no legal right to add a drop of contamination to any stream; there is no basic right to use the dissolved oxygen in the stream. There is a basic argument that will be sustained by the courts and that is that the use of water be on a reasonable basis. The reasonable use of water implies that the user has performed all treatment that can reasonably be expected. There would appear to be only one way of viewing "reasonable" treatment—that the treatment be upon a reasonable cost basis, not a reasonable use of the dissolved oxygen in the stream.

In the past, the actual operation of the dissolved oxygen use theory has been pretty much on the basis of first come, first served. Theoretically, a calculation should be made showing the total amount of dissolved oxygen available with an allocation of various percentages to the municipalities and industries affected. In actual practice, we have examples such as the Twin Cities on the Mississippi River where the standards set by the state permit less than 2 ppm of dissolved oxygen for 10 percent of the time, compared to the 4 to 5 ppm needed to sustain fish life. The original design of the plant serving these cities probably permitted adequate dissolved oxygen in the river but population growths plus new industries have reduced the available oxygen supply. Under these conditions, the Mississippi River is a sewage treat-



● EXTERIOR view of the attractive Kenyon, Minn., waste treatment plant which includes many of the design features and economies described in this article.

ment basin, without open nuisance, rather than a stream of pure water. Probably local opinion in the Twin Cities is that entirely adequate treatment is provided by its primary treatment plant and that there is no need to anticipate any future expenditure for many years to come. This is typical of the "right to use the dissolved oxygen" theory.

## "Reasonable Cost"

The answer to the question of "reasonable" cost includes many factors and opinions. It is probable that most engineers would say that primary treatment will produce a "reasonable" cost figure but that complete treatment at approximately twice the cost of primary treatment is not reasonable. Primary treatment is, in general, the lowest in cost of all treatments. Custom, at least, would appear to have made this the "reasonable" cost figure. The answer to this cost argument and to the necessity for a high degree of treatment is to construct complete treatment plants for the cost of primary treatment. We believe that, by a change in the theoretical approach to the problem, this becomes possible.

Primary treatment usually consists of three units, a settling tank, a digester and a sludge bed. The plant

will produce from 15% to 40% removal of organic material. It includes minor treatment for the liquid and complete treatment for the removed solids. The solids represent a very small part of the total volume of sewage and yet the money expended for treatment of these solids is disproportionately high. The substitution of another form of processing solids over the digester method may produce a large saving. This saving, with other smaller savings in the design, can be used to produce complete treatment for a cost within a few percent of the cost of primary treatment. If we assume that the legal requirements demand complete treatment and that costs, at least for our industries, must be reasonable, this means treatment of the liquid, not the solids.

## Filter Plant Economies

The biological filter type of plant is a relatively standard method of treatment and this article relates to economies available in the design of this type of plant, which normally includes a primary settling tank, a filter, a final settling tank, a method of processing the solids and a control house. The following are the bases for the recommended economies:

*Primary Settling Tank:* Construct

a tank based upon a detention period of about fifteen minutes at maximum flow. This tank is less than one-sixth the size of the customary primary settling tank and there is a consequent major saving. Following is one theory as to the use of a small primary unit:

Quite a number of treatment plants incorporating only a self-cleaning fine screen for primary treatment have been constructed and operated for periods up to fifteen years in the North Central States. The reason for this use of a fine screen has been the sounder treatment of milk and animal killing wastes as well as the economy involved. Years of operation have shown that overall plant treatment will be the same whether a fine screen or long-term primary settling is used. This conclusion is part of the standards of the Upper Mississippi River Group.

The argument is sometimes advanced that long-term settling will produce a more uniform sludge. Actually, the longer the settling time, the more sludge will be removed and the less uniform this sludge will be. A short-term settling tank or a 10-mesh screen will remove only that portion of the solids which tend to clog the filter. The balance of the settleable solids, being trapped in the microbial forest of the filter flora and released as a part of the sloughed flora, will produce a relatively constant type of sludge. Filter slough should not be pumped at a high velocity since this breaks it up into finely divided material which is hard to remove from the liquid; and, with long-term storage in a large primary tank, these solids tend to return to solution.

In the case of dumping sour milk, the filter, not the settling tank is

the stabilizing agent with respect to pH, and the quicker the liquid reaches the filter, the quicker the organic matter becomes stabilized. A filter media that is self-cleaning, such as tile filter media, is better prepared to handle the problem of deposited casein than a primary tank. A large primary settling tank cannot be considered a better diluting agent than a large final tank with the return of the recirculated liquor to the filter influent.

It is therefore believed that the primary tank should be sufficiently large to remove only that material which would plug the filter and which is too large to be treated by the microbial forest of the filter flora. The critical material, from the settling consideration, is feathers. Some will float; others will sink; and some will acquire practically the same specific gravity as the liquid. The SpiraFlo tank with the deep skirt meets this situation best because of the longer flow distance and lower velocity of flow.

**Filter:** A filter following a short-term primary will have a potential heavy load of suspended material to treat. The filter media should have a maximum amount of effective surface available and should be self-cleaning. Prefabricated tile media costs about three times as much as rock media but the use of a high loading—three pounds per cubic yard—results in low costs. Rain-like distribution, as provided by the Aero-Filter, is required with tile media. This type of filter, with allowance for the small size of the primary tank, produces a low overall cost.

**Final Settling Tank:** This tank is based upon a design of 1200 gallons per square foot overflow rate at average flow. The use of a SpiraFlo tank

in place of the more standard tanks permits of the use of a velocity of one-half foot per second in the race and the withdrawal of all recirculated liquor from the race rather than from the center portion of the tank.

### Solids Disposal

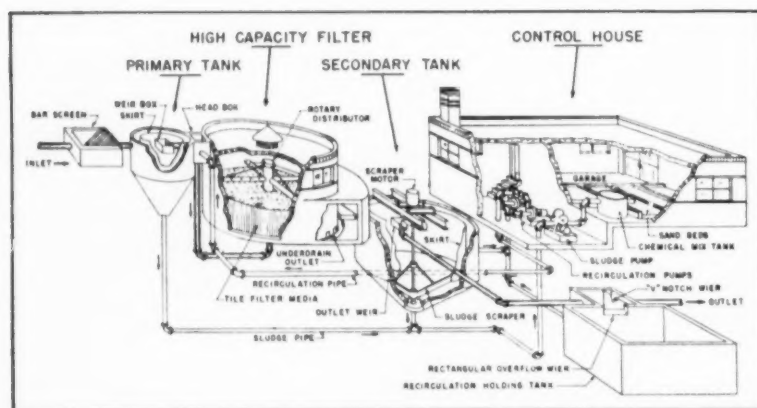
In the larger communities, the use of vacuum filtration with a sludge storage tank, similar to that used by Laboon in Pittsburgh is attractive. Treatment of sludge by chemicals with dewatering on sand beds is more suitable for cities below 5000 in population. This process consists of pumping the fresh sludge to a 500-gallon open-top tank, adding anhydrous ferric chloride in an amount of 2 lbs. per 100 gals., stirring for twenty seconds and then passing the sludge to sand beds where it dewateres in about six hours. The cake is practically free from odor, is nearly sterile, and can be picked up from the sand bed by means of a fork. The method, in use for about eighteen years, is simple, free from trouble, flexible and has an extremely low initial cost. In the case of a community of an equivalent of 4000 people, the sand bed would cover an area 40 feet by 20 feet.

### Prestressed Bridge

(Continued from page 62)

Concrete for the prestressed girders, diaphragms and the end anchorage encasement has been specified for a minimum 5,000 psi compressive strength at 21 days, a maximum 2½-in. slump, a maximum ¾-in. size coarse aggregate, a fine aggregate as specified for their Type A concrete sand, and a minimum of 8½ sacks of portland cement per cu. yd. of concrete. Concrete for the abutments, safety curbs and sidewalks is specified to be a State Road Commission's Class A concrete with Type Ia portland cement. Specifications call for the grout to be 1.3 parts of portland cement, 0.7 part sand not greater than 1/64 in. grain size and 1.0 part water.

When the girders are placed on the abutments, a 5¼-in. space will exist between the adjoining diaphragms and top flanges. This space is to be filled with cast-in-place concrete of a quality specified for the girder concrete. Lateral prestressing will proceed only after this fill-in material has hardened to 4000 psi.



● PHANTOM view of the sewage treatment plant at Onamia, Minn., showing the small primary tank and the control house with chemical mix tank and sludge beds.





## A WATER SYSTEM BOTTLENECK

**A**LL the facilities were at hand to deliver water at the needed rate of four million gallons daily to the consumers of Mitchell, South Dakota, but twenty-four hour pumping resulted in a distribution of only 3 mgd. For a city that had a limited amount of funds and a recently acquired debt of \$700,000 spent for water department improvements, this was a major problem that had to be solved with a minimum amount of cost.

Our water supply is obtained from Lake Mitchell which was constructed in 1929. At that time a filtration plant was built near the lake and a 16-inch pressure line 8700 feet long was installed from the plant to a pumping station located in the city. This system proved to be sufficient for many years, but soon after the war it became apparent that the water plant was overloaded to the extent that it would have to be enlarged. A new water treatment plant employing the lime-soda ash method of softening was constructed in 1950 at a cost of \$450,000. This plant, capable of treating 6 mgd, was designed by Charles A. Trimmer, consulting engineer. We could now deliver more water to the city than the distribution system could handle.

The next step was to increase the capacity of the distribution system. This was done by installing two new 4 mgd pumps in our pumping station and replacing 12,000 feet of 6-inch and 8-inch watermain with 30-inch, 24-inch, 20-inch, and 16-inch mains throughout the city. This was completed in 1951 at an expenditure of \$250,000, which was all the money left of a \$700,000 bond issue.

We now had a 6 mgd plant and

**V. C. FRANCIS**

City Engineer, Mitchell, S. D.

a distribution system capable of handling this amount, but could pump only 3 mgd through the 8700 feet of 16-inch main from the water treatment plant to the city pumping station. Calculations indicated that this main should easily deliver the amount of water needed under existing maximum demand conditions. It was apparent that the inside condition of the main caused a serious friction loss and a reduced discharge. Two courses of action could be taken, namely: install a new main paralleling the existing line, or

clean the original main to the extent that a major portion of its rated capacity would be restored.

In order to reach full capacity of 6 mgd, it would have been absolutely necessary to install a new main at a cost of approximately \$150,000. This the city did not have. The peak needs of the city for the next five years was not expected to exceed 4 mgd, so it was decidedly to our advantage to have the main cleaned. We had had no experience in main cleaning, so knew nothing of the costs or the amount of time the line would be out of service. In our case, the "shut down" time was very im-

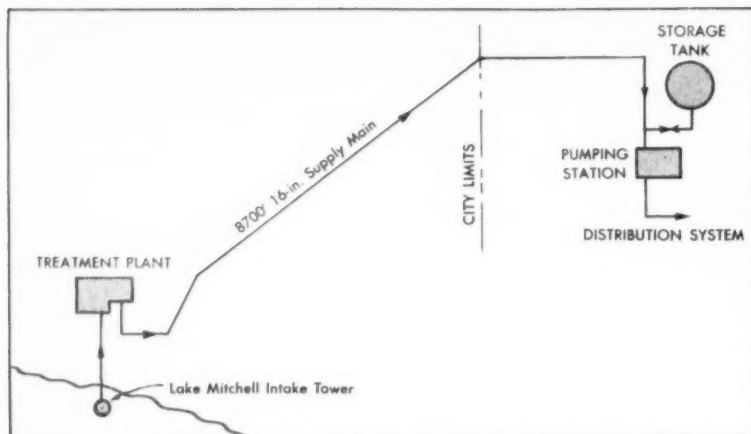
portant, as this line is the only source of supply for the city.

The Ace Pipe Cleaning Company of Kansas City, Missouri, was contacted and negotiations were made, which resulted in a contract with them to clean this main during the month of December. The winter months are better for us due to a smaller demand. We were new to watermain cleaning and left the project entirely in their hands, with the request that the line not be out of service for more than eight hours, if at all possible.

Watermains can be cleaned by a pressure driven tool or a power driven tool. The pressure tool consists of a torpedo-like head, which has fins and is propelled by the action of water pumped through it



● WORKMEN cleaning up material that was removed from the pipe line.



● **CLEANING** the main shown in the diagram above resulted in an increase in capacity from 3 mgd to 4.75 mgd. The main was out of service briefly.

under pressure. Attached to the head are three units with scrapers on them. A cut is made in the water main, the tool is inserted and the main is then put back together with Dresser couplings. At a pre-determined point—in our case, 4000 feet from where the tool was inserted—another cut is made for the purpose of recovering the tool. This cut is left open. Water is then pumped under a pressure of at least 40 pounds per square inch for a sixteen-inch main, and at a rate of at least 1500 gallons per minute to drive the tool through the pipe. All scrapings are carried by the water through the main and discharged at the point the tool is recovered. The tool is propelled at the rate of about one hundred feet per minute, and does a thorough job of cleaning.

The power tool method of cleaning is done with a tool made of a circular steel frame to which four steel weights are attached by chains. The tool is rotated by rods and the rotation process loosens the scale on the inside of the pipe. The pipe is run one-fourth full of water during the operation to carry the removed scale to the point of disposal.

It was decided to clean the main with the pressure tool from the plant to a point 4000 feet towards the city. The pipe was uncovered and an initial cut made to prepare for the installation of the tool. An inspection of the pipe was made after the section had been removed and the conditions were found to be as expected. The pipe was coated with about one-half inch of lime tubercles. It was necessary to drive the pressure tool into the pipe with sledge hammers because it is very tight fitting. The work involved in

placing the tool in the pipe makes one wonder how it can be expected to travel through the pipe under such a small pressure. We began pumping with our 200-hp Fairbanks-Morse centrifugal pump. Less than thirty minutes later the tool arrived at the point of recovery.

## Fill Stabilized in Layers to Prevent Pavement Damage from Settlement

A new and faster method of mixing layers of fill which will prevent pavement damage due to uneven settling is being used by R. H. Wright and Sons, Uleta, Florida, on their contract to modernize 7 miles of Route 9 at the northern outskirts of Miami. Using an International TD-24 crawler tractor for the towing unit, fill is mixed in six-foot widths to a total depth of 12 feet by a Woods Preparizer.

In placing the fill for the two 100-foot approaches to a cloverleaf where Route 9 crosses U.S. 441 and the Seaboard Airline Railroad tracks, the mixer took only half an hour to cover each approach one time. Previous mixing methods required about 10 hours.

In addition to fill mixing, the unit is being used to mix subgrade and base for the entire 7 miles of the mall-divided four-lane pavement.



● **THIS IS** the equipment used for stabilizing a fill at a bridge approach to avoid pavement damage by uneven settlement. Crawler tractor tows mixing unit.

# RUBBER IN PAVEMENTS

## — A Progress REPORT

Considerable interest has been developed in recent years in the experimental stretches of highways and streets laid with rubber as an admixture in the asphalt. This followed the laying of such pavement in Holland, where more than 30 test sections were laid between 1935 and 1940.

Much has also been published on the subject, but so far as PUBLIC WORKS has been able to learn, none of it has been from the standpoint of those who have laid these roads and have been observing carefully their performance. In order to get the opinion of highway officials concerning the value of rubber in pavements based on these experimental sections we asked as many of them as we could locate for their comments.

Those received add up to just two important points—that there have been no failures, and no adverse comments; and that a longer time and service period is needed before arriving at a final evaluation. As far as the experiments have gone, the verdicts may be classed as favorable.

As background for the story, rubber has been used in combination with bituminous material in bituminous concrete and for surface treatments in the United States for several years. The rubber has been combined with the bituminous material in some cases and has also been used in a granular or crumb state as a portion of the mineral aggregate. Natural and synthetic new rubber, as well as some reclaimed rubber, has been utilized. Generally the amount of rubber has been from five to ten percent of the weight of the bituminous material. In most cases, no modification of the usual paving procedure has been necessary because of the presence of the rubber.

Highway officials can be expected to be conservative in their statements about their experience to date with these test stretches. And



● LAYING a rubber-asphalt pavement. Standard procedures are normally used. This section of pavement is on Route 111, north of Towson, Md.

many of their comments which we undertake to quote verbatim here have the strength of understatement.

Most officials stated that it was too soon to draw permanent conclusions this early in the game, but they do agree that at present the sections where rubber was used appear about the same as the adjacent sections of regular material. In other words, they stand up equally well. No detrimental effect due to the rubber was reported.

### Comments from Engineers

Tilton E. Shelburne, Director of Research of the Virginia Council of Highway Investigation and Research comments:

"We are continuing our follow-up studies on these experiments, and while the sections containing rubber show slightly better resistance to skidding, from a visual standpoint, it is difficult to distinguish between the sections containing rubber and the control sections."

Virginia is reported to have two short stretches of this paving, which have now been in service and under close observation since 1949.

Iver G. Schmidt, Highway Engineer of the City of Akron, Ohio reports:

"We have an experimental section of rubberized asphaltic concrete pavement that has been in service just over 4½ years. This is on Exchange Street, which is one of our major traffic arteries and carries around 23,000 vehicles per day.

"A recent inspection of this work disclosed no appreciable difference in appearance between the sections containing rubber and those without it. All sections are standing up very well and about the only signs of wear or disintegration are where cuts have been made to repair underground utility lines. It should be kept in mind that this was an excellent resurfacing job to begin with and the length of time that it has been in service is still too short to reveal anything significant."



● Canada also lays rubber-asphalt surfacings. This shows a section on Route 11, north of Montreal, Canada.



● WHAT a completed rubber-asphalt pavement looks like. This is a section of Route 28, in Massachusetts.

In addition to this busy street in Akron, the Ohio State Highway Department is understood to have five rubberized strips in the pavement of Route 18, near Akron, on which no report is presently available. This, too, was laid nearly five years ago and is still under study.

Massachusetts has used more rubber in paving than any other state—both in heavily-traveled Boston area streets and in highways carrying heavy traffic out through the state. So the comments that follow from John A. Volpe, Commissioner of Public Works of the Commonwealth of Massachusetts, can be given considerable weight. He reports:

"This Department has installed a number of experimental test roads with rubber-asphalt bituminous concrete. The rubber-asphalt hot-mix was generally used to resurface old concrete heavy-traffic routes. The resurfacing consisted of 2½ ins. of hot-mix Type I, with additions of 3 to 7½ percent of rubber by weight to the asphalt content of the mix. Various types and granular sizes of reclaimed, natural, and synthetic rubber were used and the rubber was added in some cases preblended in the asphalt and in others as an additive to the mix similar to the aggregate.

"The purpose of the use of the rubber additions was to reduce the brittleness of the regular asphalt in cold weather, to reduce the cracking over old concrete bases especially over the transverse joints and to improve the bond and stability of the mix.

"The first installation was made in 1949 with reclaimed rubber. The results over the first winter indicated improvement and a general

experimental program was started and carried out in the past two construction seasons, using different percentages, types, and methods of addition for comparative job results.

"The results up to date indicate additions of 5 to 7½ percent rubber decrease the brittleness and resultant cracking of bituminous concrete and increase the bond of the asphalt to the aggregate. In our opinion at the present time, natural rubber and some types of synthetic rubber are preferred and we favor the finer granular sizes properly pre-blended and compounded with the asphalt.

"As no standard laboratory tests have so far been developed to evaluate the long-time service performance of rubber-asphalt mixes, no final conclusions are possible up to this time except the improvement in resistance to cracking and general condition of the various projects.

"We have a laboratory research program in progress and we have developed a tentative standard brittleness test. The results so far concur with the observed results on the various jobs."

H. F. Clemmer, Engineer of Materials and Standards of the District of Columbia, in a paper at the February meeting of the ARBA comments:

"Additional costs of bituminous rubber construction would be confined to the costs of the additives since no construction problems were encountered in the paving plant operations or in the placing of the bituminous materials which would increase costs. Costs of the additives for this project are not available since these were furnished by cooperating rubber companies.

"The bituminous rubber surfaces in the wet condition at fifteen months showed a slight increase in skid resistance over that of the comparable control sections. In the dry condition, there was no significant difference between the control sections and the bituminous rubber sections. This conforms with the findings reported by Tilton Shelburne of Virginia.

"At this time there is evidence from the field study of the project that rubber additives do have an effect upon bituminous mixtures. It appears that the incorporation of rubber in bituminous mixtures may be beneficial in preventing crack development in bituminous paving. Rubber asphalt blends initially showed an effect on the penetration, flow, ductility and softening points over that of the parent asphalt for each rubber additive. Results of laboratory tests show that the rubber additives do affect the physical characteristics of the bituminous mixtures, and it is believed these results indicate a beneficial effect."

It might be added that reports were received from engineers and highway officials in Connecticut, Maryland, Michigan, Texas and Province of Quebec; and in the cities of Milwaukee, Washington, and New York. These concur on one point: that the time has yet been too short in their cases to venture authoritative opinion. But they reflect an active interest in the course of their experiments and are unanimous that nothing unfavorable to the use of rubber has thus far developed in their yet-limited experience with it.

The case might be summarized at present as "So far, so good."





● THIS is a rear view of the incinerator at Alhambra.

## COSTS OF MUNICIPAL REFUSE INCINERATION



**R**EFUSE in Alhambra is incinerated, but garbage is collected separately and fed to hogs. The incinerator, which serves a population of about 52,000, has been in operation for the past three years. It is a Nichols Monohearth, with a mechanical stoking device, and consists of one furnace unit with a rated burning capacity of 150 tons in 24 hours. It is located on a sloping site adjacent to a low area where ash disposal is easy. This site permitted economical construction and made gravity handling of ash possible. The plant has three floors—the upper or charging, the furnace, and the ash room floors. The service yard of about one acre is entirely paved. On the same level as the charging floor, about three-fourths of the area can be used for the storage of combustible materials. This is advantageous because it permits selectivity of materials to maintain the desired furnace temperature.

Charging is done with a D2 Caterpillar tractor equipped with a hydraulically controlled loader bucket of  $\frac{3}{4}$ -yd. capacity. Bolted to the inside bottom of the bucket are four

**W. M. JARRETT,**

City Engineer and Street Superintendent,

Alhambra, Calif.

high-carbon steel tines,  $1\frac{1}{2}$  ins. in diameter, evenly spaced and extending 30 ins. beyond the shovel edge of the bucket. With the loader bucket operating as a pitchfork, a much larger charge of refuse can be handled.

Incinerator operation requires three men who work one 8-hour shift 5 days a week. One man is on the operating floor; classed as an Incinerator Foreman at \$2.00 per hour, this man has direct charge of the plant. One man, an Incinerator Operator at \$1.70 per hour, operates the charging doors and does other work as directed by the foreman. The third man is classified as a Light Equipment Operator and receives \$1.79 an hour. He operates the tractor loader and charges refuse into the furnace through the 4 ft. by 7 ft. opening. All three men assist in removing ashes and in plant maintenance.

During the fiscal year 1950-51 we burned an average of 31 tons per burning day and in 1951-52 we incinerated 37 tons per burning day, or 6.25 tons per burning hour, which is the rated capacity of the incinerator. For the first 6 months of this fiscal year, we burned 6.19 tons per burning hour. This decrease is believed to be due to the inclement weather during a portion of this 6-month period.

The incinerator is adjacent to the city's non-combustible dump and the scales are so located as to serve both conveniently. Private individuals delivering combustible waste materials are required to pay a disposal fee, as follows: Not more than 100 pounds 25 cents; 101 to 200 pounds 35 cents; 201 to 300 pounds 45 cents; and 15 cents per 100 pounds thereafter.

For the FY 1951-52 the cost of operation of the incinerator and dump, including fixed charges, was as follows: *Combustibles*, 9,029 tons, direct cost per ton \$2.49; other costs per ton, including amortization of bonds and rolling equipment depreciation, \$1.67; total cost \$4.16.

Against this there were revenues of \$6,814.35 which reduced the cost of disposing of combustibles to \$3.40 per ton, compared to \$3.80 in the preceding year. *Non-Combustibles* totalled 14,315 tons, with a direct cost of 57 cents per ton, plus 6 cents for amortization and depreciation, making a total of 63 cents a ton, which was reduced to 41 cents net by revenue. The total cost for combustibles and non-combustibles was \$1.57 per ton as compared to

\$1.81 per ton in the preceding year.

From residential collections there was an aggregate of 5,609 tons of combustibles; from city departments 1,386 tons; and from private sources 2,034 tons. This material was burned in 243 burning days totalling 1449 burning hours. For all purposes, man-hours totalled 10,033; power was 29,310 kw; gas 4,616 cu. ft.; and water 402,253 cu. ft. Items of cost are shown in Table 1.

For non-combustibles, residential

can collections amounted to 3,282 tons; residential ash collections 1,496 tons; city department 6,607 tons; and private sources 2,930 tons. Working time for the dump and scale house amounted to 3,807 man-hours. Items of cost are shown in Table 2.

This article is based on data presented at the refuse collection and disposal symposium held recently in Berkeley, Calif., and sent us by the author.

TABLE 1—COST OF OPERATING THE INCINERATOR

Labor, plant operation .....	\$ 7,673.84	Rolling equipment M & R .....	1,284.95
Labor, ash removal .....	1,932.41	Plant replacement .....	1,041.20
Labor, plant maintenance .....	614.81	Tools, materials & supplies .....	453.88
Labor, grounds " .....	1,070.65	Supplies and printing .....	76.28
Plant repairs labor .....	204.21	Water .....	423.38
Scale house operation (one-half) .....	3,531.90	Electricity and gas .....	1,042.87
Supervision .....	526.63	Telephone (one-half) and vehicle insurance ..	89.55
Office, clerical .....	549.03		
Sick leave and vacation .....	614.64	Total Supplies & Equipment .....	4,412.11
Compensation insurance .....	387.86	Grand total .....	\$22,519.00
Retirement .....	1,000.91	Revenue .....	6,814.35
Total labor costs .....	\$18,106.89	Net cost of operation .....	\$15,704.65

TABLE 2—COST OF NON-COMBUSTIBLE DISPOSAL

Dump operation, labor .....	\$ 1,582.17	Rolling equipment M & R .....	739.21
Dump supervision .....	524.83	Telephone (one-half) and vehicle insurance ..	89.48
Clerical, sick, vacation .....	756.20		
Scale house operation (one-half) .....	3,531.90	Total .....	1,293.00
Compensation insurance .....	148.37	Grand total .....	8,219.34
Retirement .....	382.87		
Total labor costs .....	\$6,926.34	Revenue .....	2,750.75
		Tin can salvage .....	450.00
Fumigation (one-half) .....	262.50	Total Revenue .....	3,200.75
Scale house supplies .....	201.81	Net cost of operation .....	5,018.59

### Water for the Air Force Development Center

Tremendous quantities of water will be needed at the AEDC—the Arnold Engineering Development Center—of the U. S. Air Force now being built down in Tennessee. The needs for cooling water for the hypersonic air tunnel alone will reach 50,000 gpm.

Steel pipe used in the Center, according to Koppers' Bitumastic Bulletin, will total about 5 miles of 84, 78, 72, 60, 42, 36 and 30-inch, with a small footage also of 12 and 10-inch. On this pipe, which was furnished by Alco Products, Dresser couplings were used. The pipe is

protected from interior and exterior corrosion and tuberculation with Bitumastic enamels, which are made by the Koppers Co. The interior lining is about 3/32 inch thick and the exterior coating about 1/8 inch. The couplings were also coated before covering the line.

• • •

### Vertical Drainage with Perforated Pipe

To provide storm drainage for a street intersection which had no natural runoff channel and was not served by storm sewers, two vertical drainage installations were made. A suitable soil formation was lo-

cated some 35 ft. down. A shaft was sunk to a depth of 20 ft. and a 48-inch, 35-ft. long Armco perforated corrugated pipe was set in the shaft. Excavation then proceeded within the pipe until the desired depth was reached. Two such installations were made, one on either side of the intersection. Conventional curb inlets were then constructed and connected to the sumps. This installation was made at El Segundo, Calif., and results, after several heavy rains, were reported as satisfactory. Long Beach, Calif., after investigating the results, is planning several similar installations.

# Disposal of Wastes from WATER TREATMENT PLANTS

**W**ATER treatment plants fall into three general types or classifications and the waste from each type presents a somewhat different problem. These types are: (1) Coagulation, filtration, and purification; (2) lime-soda softening; and (3) cation-exchange or zeolite softening.

Wash water and sludge from filtration plants contain the silt and other matter in the waters of the stream used as a source of supply plus the chemicals used to aid in coagulation and clarification. Actually, then the character of such wastes differs little, if any, from the water course except perhaps as to concentration. If chlorination has been employed in the treatment process the bacterial content may be less than the stream.

There are many variations and combinations of methods possible in disposing of water treatment plant wastes. The method most generally followed is to discharge them direct to a stream, or other body of water. Problems encountered, their frequency, and the degree of intensity vary in direct proportion to the size, character, and flow of the stream. Carefully controlled discharge during periods of higher stream flow, as is practiced at many places, reduces the formation of sludge banks and creation of unsightly conditions. Where lakes or ponds receive the waste, silting has proven objectionable. High concentration of wastes may create a pollution problem detrimental to health, as well as to aquatic life.

In a few instances wastes are discharged into the sewer system with no adverse affects to the sewers. However, where sewage treatment plants are involved, trouble may develop. The sludge apparently does not impair the operation of the treatment process but, as has been reported for softening plant wastes, the operation of the sludge digestion and drying facilities may be seriously affected. Larger quantities of sludge result which are extremely difficult to handle and remove.

The discharge of water purification wastes into lagoons also is practiced. This appears to be a satisfactory method but has not been

**H. H. MACE,**

Alfred LeFeber & Associates,  
Consulting Engineers

widely adopted. Some reports have been received to the effect that "the odor from the lagoons is a most disagreeable feature and the source of many complaints from the nuisance standpoint."

The use of settling basins to remove the sludge from the waste water before discharge to the stream has also been employed. In some cases the supernatant has been pumped back to the treatment plant as a conservation measure. Under such a system the sludge is usually released to the stream at periods of high flow; or it is used as fill. The prime problem with this method of handling is the volume of sludge accumulated and the attendant problem of final disposal. All of these methods have been varied and combined to fit conditions.

In Ohio there are some 59 water filtration plants. Of these only one discharges waste into the sewer system and, at least to date, no sewage treatment problem has resulted. Lagoons are not employed in Ohio purification plants. Comparatively

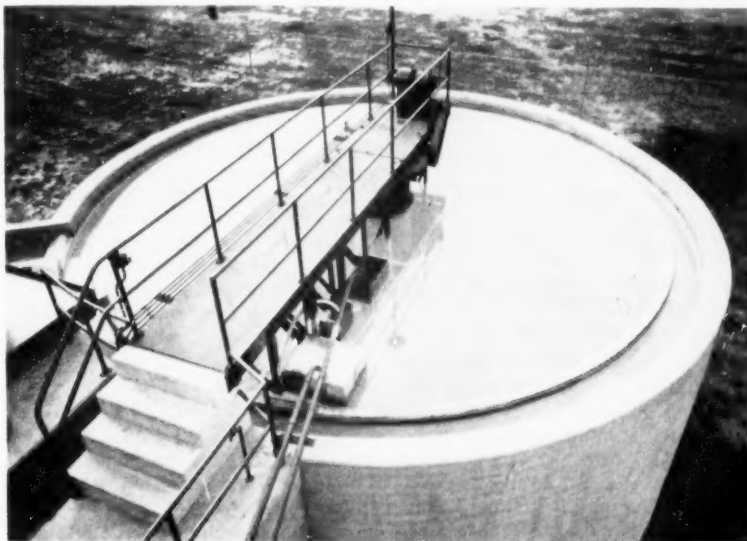
few plants have mechanical devices for treatment of such wastes. Generally speaking the sludge is allowed to accumulate and effort made to discharge the waste to the stream when the flow is large.

Are such wastes pollutants? Will higher concentration of sludges of materials similar to those already in the stream create a nuisance or a menace to health? What dilution ratios can be used? Will pretreatment be needed? What is the volume of sludge to be handled? It is obvious that there is need for further investigation and study to determine the nature and the solution to the problem.

## Lime-Soda Plant Wastes

The disposal of wastes from lime-soda water softening plants presents an even more complicated and difficult problem. The quantity of waste sludge is usually greater and it is unsightly. The sludge produced consists principally of calcium carbonate together with hydroxides and other coagulants, as well as colloidal material and organic matter. It is these constituents which make the handling and disposal of this waste difficult.

In general the same methods are available and are used for disposal  
(Continued on page 88)



● WATER SOFTENING at Lockland, Ohio. This unit is a Dorco Hydro-Treater.

# A BETTER METHOD OF

THOMAS E. NICHOLAS

**P**RACTICALLY all earthwork calculations in subdivision, highway and railway construction are made by the end area method. This method lends itself to ease in plotting grades as well as the computation of excavation and fill. In addition, it gives results, for solid earth, as near the actual cubic contents as does the true prismatic formula.

From topographical field notes taken by the surveyor, the engineer plots the elevations of the contour lines and the grade lines as shown in Figure 1. Sectional elevations are plotted for the area of the cut at each station on the roadway as shown in Figure 2. Where there is a fill instead of a cut, the procedure is similar. In Figure 2 the width of grading is shown as 100 feet from the center of roadway. This is usually true of sub-division work, but is variable depending upon conditions. With a little care and foresight the engineer plotting the grades can make the volumes of the excavations and fills nearly equal, or within ten per cent. This is desirable from the standpoint of the engineer and the contractor. Once the cross sectional areas have been plotted at the various stations from the sectional elevations, their areas are found by the use of the planimeter.

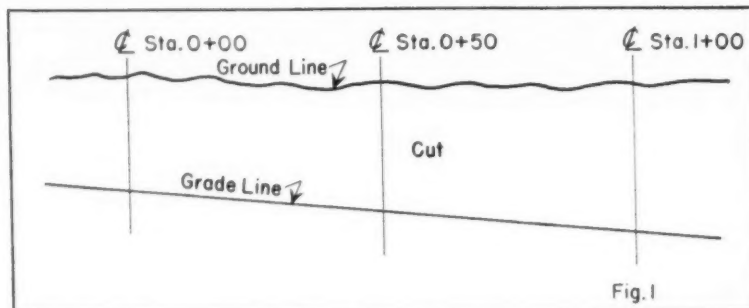
## Computing Volumes

The volume of earthwork is usually calculated between 50-foot stations by the end area formula

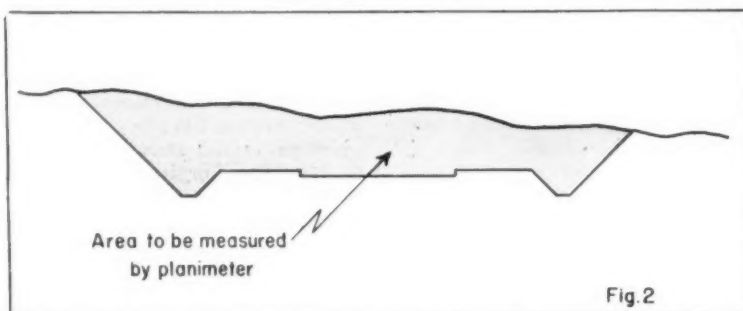
$$V = \left( \frac{A_1 + A_2}{2} \right) d \quad (1)$$

Where  $A_1$  is the cross sectional area in sq. ft. at one station;  $A_2$  is the area at a distance  $d$  feet from  $A_1$ ; and  $V$  is the volume of the cut or fill in cubic yards.

Usually areas are plotted on cross section paper with scale of one square inch equals 100 square feet, so that unnecessary conversions will be eliminated.



● ELEVATIONS ARE PLOTTED as in Fig. 1, above, from contour and grade lines determined by the preliminary topographical survey of the highway site.



● TYPICAL SECTION plotted from data in Fig. 1 shows the area to be cut. For convenience in measuring a scale of 1 sq. in. to 100 sq. ft. should be used.

Formula (1) then becomes

$$V = \frac{100}{2 \times 27} A_s d = 1.86 A_s d \quad (2)$$

Where  $V$  is the volume in cubic yards; and  $A_s$  is the sum of the planimeter areas in square inches at the stations which are  $d$  feet apart.

It must be remembered that formula (2) is for use by the office engineer for computing the volume of earthwork, after he has obtained  $A_s$  in square inches by measuring  $A_1$  and  $A_2$  with the planimeter. For example, if  $A_s$  is found to be 6.5 square inches after using the planimeter on the cross section sheet, the volume of earthwork by formula (2) would be

$$V = 1.86 \times 6.5 \times 50 = 604.5 \text{ c.y.}$$

Actually the area in square feet that represents  $A_s$  is  $6.5 \times 100 = 650$ . Checking by the end area formula (1) and the graph shown in figure 3,

$$V = \frac{650}{2 \times 27} \times 50 = 604.5 \text{ cubic yards}$$

The graph for formula (2) is shown in Figure 3. It will be noted that the graph contains three variables. Many engineering problems contain three variables and simplification as well as a clearer picture of the effect of the variables may be obtained by plotting them on graph paper. The graph in Figure 3 should be useful in both the engineering field office and also the field. It serves as an excellent check upon earthwork computations. The scales used in Figure 3 were selected so that they would serve for practically all earthwork problems that may be encountered. It should prove to be valuable to the office and field engineer.

## The Short Method

Rather than compute the volume of each 50-ft. distance separately, the following method may be used to obtain the amount of fill or excavation for as large a distance between stations as may be desired for earthwork computation.

$$\text{From (1) above } V = \frac{A_1 + A_2}{2} d$$



# EARTHWORK COMPUTATION

$$\text{Let } \Sigma A = A_1 + A_2 + A_2 + A_3 + A_3 + A_4 + A_4 + \dots + A_n \\ = A_1 + 2(A_2 + A_3 + A_4) + \dots + A_n$$

Then  $V = (\Sigma A/2)d$ , when all cross sectional areas between stations are equidistant, that is,  $d = d_1 = d_2 = d_3 = d_n$

Evaluating

$$V = d/2 [A_1 + 2(A_2 + A_3 + A_4) + \dots + A_n] \quad (3)$$

$$V = d (A_1/2 + A_2 + A_3 + A_4 + \dots + A_n/2) \quad (4)$$

Where  $V$  is the volume in cubic yards,  $d$  is the distance in feet between stations or cross sectional areas, and  $A_1, A_2$ , etc., are the cross sectional areas in square feet.

By means of formula (4) earthwork computation may be made for

as great a distance as desired without computing the volume of each 50-ft. section separately. It can be seen that in using formula (4) for large volumes of earthwork, the computations may be greatly simplified especially for preliminary work

and final results obtained more readily. Useless repetition which is the stumbling block for engineers may be avoided. In using formula (4) it must be remembered that it is applicable for equal distances between stations whatever they may be, fifty, sixty or hundred foot stations.

Where distance between stations varies considerably, it will be necessary to compute the volume of each section separately. However, when the inequality of distance between stations is not great, this high degree of accuracy usually is unwarranted. Formula (4) may be used even though a few sections may vary somewhat from the usual 50-ft. section used in earthwork computation. In any event, the percentage of error involved can easily be ascertained by the engineer so as to keep it within the desired limits of earthwork calculation. Precision of measurements is just as applicable to earthwork as it is to any other type of engineering work, even though the percentage of allowable error may be somewhat greater.

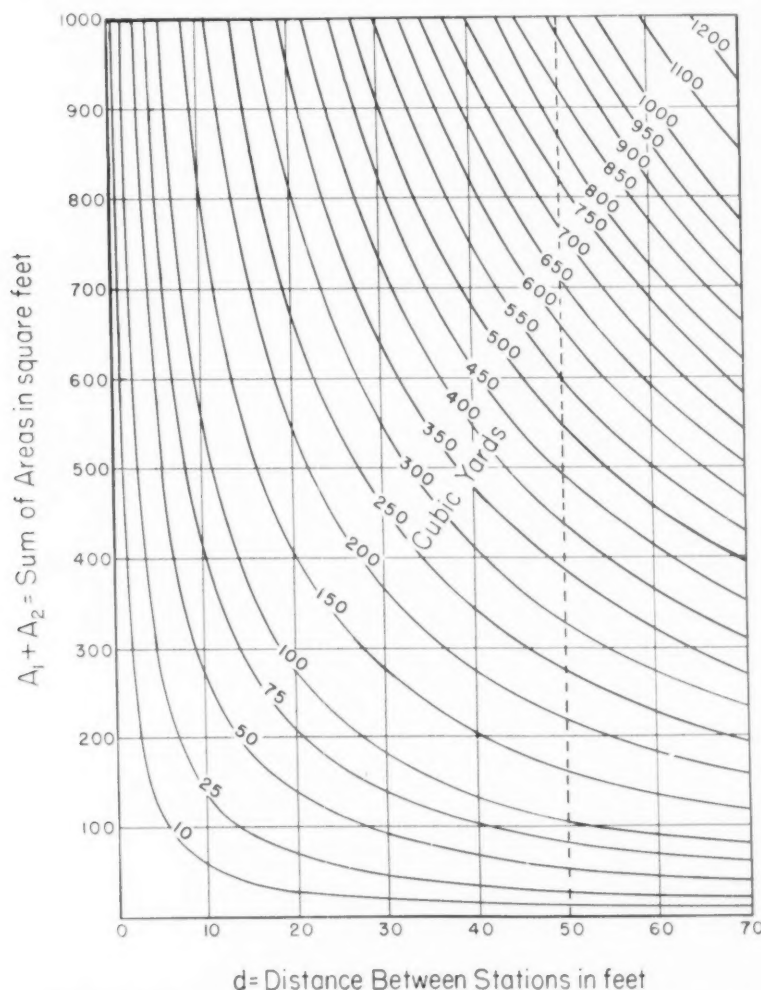
• • •

## Making a New Playground

A parcel of swamp property that had presented nothing but a problem to the city fathers of Gary, Ind., is being turned into a park and playground area. The sanitary landfill method of garbage disposal is providing the means of reclaiming the marsh land for recreational purposes. To date, more than 20 acres have been "built."

First step in the conversion occurs when city trucks and other vehicles hired for garbage disposal dump refuse into the swamp. When waste piles up, International TD-18A or TD-9 crawler tractors are brought in to spread and compact the mass. When the region is completely compacted, it is covered with 10 inches of sandy loam. Next, six inches of topsoil, purchased from a nearby farm, is spread over the site, using an Austin-Western motor grader. Last step is the seeding of the newly created land.

City planned and constructed, the project is under the direction of Glen Smith, commissioner of streets.



● GRAPH FOR Formula 2 permits quick calculations of volume in cu. yds.



## HOW A SUBMARINE WATER MAIN WAS LAID

A. R. MacPHERSON

**T**HE Tacoma Water Department is completing one of its major installation jobs of the year in the Port Industrial Waterway. The project involves laying a 32-inch steel water main across the bottom of the channel at a depth 30 feet below mean low tide. A wooden trestle formerly carried the main across the channel but the present construction of a \$1,300,000 bascule-type bridge to replace the trestle necessitated installation of the new main on the channel bottom.

A most unusual method of laying the main was employed by the engineers of the Seattle diving firm, Truxell & McCray, contractors for the project. The whole 530-ft. long section of welded pipe had to be lowered into the trench on the channel bottom simultaneously at the same level for every foot of its length. The tough job called for a most unorthodox solution and many weeks of detailed preliminary work, with the actual lowering of the long main being accomplished in twelve hours time over a period of several days.

The project began with excavating a 6-ft. deep trench across the sandy bottom of the channel. A revolving American derrick mounted on a barge and employing a 1½-yd. clamshell bucket excavated the trench. As this involved a submarine operation, diver Walter McCray engineered and guided the trenching job across the channel bottom.

A pile-driver was then brought in to drive twelve series of 90-ft. long wood piles across the channel bottom straddling the trench for its entire length. Each series of piles consisted of four logs to form a single rectangle 4 by 6 ft., with each series evenly spaced across the channel and extending 15 feet above the surface of the water. Four 8-in. by 8-in. timbers were then secured crisscross on top of each series of pilings to form a base on which was placed a marine winch.

The twelve winches were discarded Navy surplus formerly used on Navy LST boats. The electric motors had been removed from the winches, thus allowing for hand operation and control of each winch. Gravity and the weight of the long main was counted on for lowering of the pipe to the channel bottom,

● **READY** for lowering: 530-ft. section of pipe is supported on bents and will be lowered by releasing brakes on drums above.

its descent being controlled by the drum brake.

Two 50-ft. long, one-half inch steel cables were wound around the drum of each winch and channeled through pulleys hanging below each winch and suspended between each series of pilings. Below the pulleys the cables were secured through shackles to a saddle. Thus the entire weight of the long main rested on the twelve saddles during its assembling, preliminary processing and the final descent to the trench which had been prepared in the channel bottom.

The 32-ft. long, half-inch thick steel pipes were supplied by the American Pipe & Construction Co. of Portland, Ore. They were tarred inside and out and gunited on the outside with a 2-inch coating of cement for protection from salt-water corrosion. Welders first assembled the main on the channel shore in two-pipe sections, welding the connecting ends and seams inside and out and thickly tarring the seams. Two Lincoln welders were employed for the job. The two-pipe sections were then hoisted onto a barge which was moved out into the channel. The marine derrick then hoisted each pipe section and carefully juggled and guided the

**ALL-STEEL**  
*Swimming Pools*  
 by **PITTSBURGH**  
**• DES MOINES**

**HIGH PERMANENCE  
 LOW MAINTENANCE**

**—Lifetime Service  
 and Economy!**

*Ligonier, Pa.*  
 Pool 36 ft x 75 ft



*Hornell, N.Y.* Pool 60 ft x 120 ft,  
 with 20 ft x 50 ft wading pool



*Red Wing, Pa.*  
 Pool 36 ft x 75 ft

The many advantages of Pittsburgh-Des Moines Steel Swimming Pools include *complete watertightness* at all times, unaffected by frost action, ground movement, or seasonal change. Smooth, sanitary surfaces, requiring only periodic painting to keep new-looking for a lifetime, make your P-DM Pool always attractive, always an asset to you. • Let us give you the figures on *low first cost, low upkeep* by any comparison. Write!



**PITTSBURGH • DES MOINES STEEL CO.**

Plants at PITTSBURGH, DES MOINES and SANTA CLARA

*Sales Offices at:*

PITTSBURGH (25).....3442 Neville Island	DES MOINES (8), 943 Tuttle Street
NEWARK (2).....236 Industrial Office Bldg.	DALLAS (1), 1247 Praetorian Bldg.
CHICAGO (3), 1246 First National Bank Bldg.	SEATTLE.....550 Lane Street
LOS ANGELES (48), ....6399 Wilshire Blvd.	SANTA CLARA, CAL., 649 Alviso Road

pipes into position between each series of pilings until they came to rest in the steel saddles suspended below the winches.

Operating from small boats, workmen connected the two-pipe sections and welders proceeded to weld the seams inside and out. After tarring the seams they were cemented to complete finally the 530-ft. long main and it was ready for the descent to the channel bottom.

The reinforced concrete bed or boxes in which the main rested in the trench for a distance of 50 feet

out from either shore, were constructed earlier on the shore bank in 6-ft.-long sections. Concrete was poured into cradle-shaped wooden forms of sufficient depth to enclose most of the 32-inch pipe. The derrick later hoisted the concrete cradles and lowered them to the bottom of the channel where diver McCray positioned and lined them together in the trench.

With a man stationed at each winch atop the twelve series of pilings, the delicate operation of lowering the long main got under way. A signal man with a whistle

was stationed midway along the main and at a given whistle the twelve workmen very carefully and slowly released the drum brakes on the winches, thus allowing the long main to descend evenly a few inches at a time. Markings previously made on the winches enabled workmen to gauge accurately each descent of the pipe by the number of wheel revolutions, with all winches making the same revolutions simultaneously under pre-determined orders by the signal man as to the number of revolutions for each drop.

Water was allowed to enter the main to check its buoyancy and aid the descent. There were numerous long stops and several days were required in order to check the uniformity of level of the whole pipe for every foot of its descent. The diver went down frequently to inspect the lowering operation and guide the main into the trench on the channel bottom. Considerable maneuvering of the main and additional trenching was called for before the long pipe rested evenly for its entire length across the bottom in compliance with required specifications.

One of the difficult phases of the job was to adjust the conformity of the pipe to the conformity of the concrete trenches as the main rose from the channel bottom to the surface at either shore end. This phase required considerable time and readjustments, most of which had to be carried out during periods of low tide when the concrete boxes were above water.

The final operation consisted of pouring a thick slab of concrete over the top of the main and the concrete boxes to protect the pipe from damage by ships passing overhead on their way thru the channel.

W. A. Kunigk, Superintendent of the Water Department, was in charge of the project for the city, while George Hopkins, City Engineer, served as inspector and overseer on the job site.

• • •

#### How to Cool Off a Hot Well?

"The biggest problem" facing the Alamosa, Colo., Water Department, is that of cooling off a hot well. This well, which has a flow of 2200 gpm produces water with a temperature of 97°F. It has not been used since it was completed, as no suitable solution to the problem of making this hot water fit for use has been found. J. A. Meehan is superintendent of Water.



T-HEAD BOLT  
FOLLOWER RING  
GASKET

Made-up Mechanical Joint cut away to show its design.

Standard compression type fire hydrant made in full compliance with latest AWWA Specifications. Available in Standard model or Traffic model. Main valve opens against the pressure. Valve will remain closed in case hydrant is broken off in traffic accident. Features include low friction loss, high efficiency, revolving head, dry top, easy lubrication.

Hydrant shoe has two heavy lugs for use in strapping hydrant to pipe line. The end connection is Standardized Mechanical Joint in accordance with specifications of Cast Iron Pipe Research Association. A thick gasket is compressed by a bolted follower ring. Advantages include easy assembly, low joint cost; deflection, expansion and contraction without leakage. For complete information, write or wire M & H VALVE AND FITTINGS COMPANY, Anniston, Alabama.



## M&H PRODUCTS

FOR WATER WORKS • FILTER PLANTS  
INDUSTRY • SEWAGE DISPOSAL AND  
FIRE PROTECTION

Now's the time to mail this month's Readers' Service card.



## Lighting and Traffic Control

### Standard Practice for Street Lighting

The new American Standard Practice for Street and Highway Lighting, prepared by the Illuminating Engineering Society, is available in 32-page booklet form. It includes the latest information available on the very serious and frequently tragic lighting problem. Studies show convincingly a relationship between good fixed lighting and traffic safety and indicate that adequate street and highway lighting contribute not only to the reduction of highway accidents but also, in urban areas, to improved traffic movement and crime prevention.

Liberally illustrated with tables, charts and drawings, the new Standard Practice presents the underlying principles involved in the layout and design of good street and highway lighting. The booklet classifies as to type: highways; luminaire light distribution, both vertical and horizontal, complete with detailed drawings; design of street and highway lighting, including luminaire mounting heights and positioning. Information on situations requiring special consideration is covered such as: reforestation; curves and hills; intersections; grade crossings; tunnels and underpasses; and others. Tables furnish data for handy reference on classification of vehicle and pedestrian traffic as to volume; luminaire mounting heights; and recommended horizontal footcandles. Appendices give background information on fundamentals of the street lighting problem; computation of roadway illumination; measurement of factors; and glossary of terms used.

Copies of this new 32-page booklet may be obtained from: Publications Office, Illuminating Engineering Society, 1860 Broadway, New York 23, N.Y. Price \$0.50; quantify prices on request.

### Better Lighting for a Drafting Room

A new and modern lighting system has been installed in the drafting room of Bucyrus-Erie of South Milwaukee. The drafting room is 60 ft. by 130 ft. The old system pro-

duced only 20 footcandles on a horizontal plane—considerably below the standard deemed necessary. A system of fluorescent lighting was installed by Solar Light Mfg. Co., which produced 130 footcandles. In order to make the shift from the old to the new system gradually, staggered lighting was provided but this is no longer used.

### Making Traffic Signals Visible

Ernest W. Fair

THE number of street crossing traffic accidents that were caused by the inability of motorists to see traffic signals has been growing instead of diminishing. Only recently has it been apparent that where



signals were set against a bright sky or a bright ascending or descending sun the motorist was perfectly honest in his declaration that he could not see the color or changing color of a given traffic signal. At Topeka, Kansas, this problem has been solved with the installation of black painted black-boards completely surrounding traffic signals, as shown above. The boards serve to shield the sun's glare from the motorists' eyes as well as permit signal lights to stand out more sharply.

### How Parking Meters Pay Off

Burlington, Vt., is a city of about 35,000 population. Located in the northern part of the state, where winter conditions are severe, parking meters in 1952 brought in more than \$60,000. There are 345 one-

hour meters, 257 two-hour meters and sixteen 12-minute meters on the streets. These brought in \$58,164.02 during 1952 and \$9,789.00 from Jan. 1 to March 10, 1953. There are 24 one to five-hour meters in a parking lot; these brought in \$2,232.82 in 1952.

Over the 6-year period since the first 425 meters were installed (to March 10, 1953), the total income has amounted to \$325,154.60. A part of this revenue has been spent for traffic improvements, including an off-street parking lot; and another off-street lot is about to go into service, which will utilize 108 more parking meters. Charles R. Ables is in charge of enforcement, servicing and collections. All of the 642 meters now in service, as well as the 108 meters for the new lot, were furnished by the Magee-Hale Park-O-Meter Co. of Oklahoma City, Okla.

### Influence of Highway Design on Highway Accidents

EVERYONE agrees that highway accidents are a very serious matter and that the highway official should design roads so as to keep to a minimum conditions that may make accidents probable. However, there has been a lack of factual data concerning the influence of various design features on the accident rate. The Bureau of Public Roads has completed an extensive study which is reported by Morton S. Baff in the June issue of their magazine *Public Roads*.

Some of the results are what might be expected while others run quite contrary to our usual ideas.

Volume of traffic influences the accident rate on nearly all types of highway sections. In general the accident rate increases with the increase of traffic. There is often a slight reversal of this trend at very high volumes. Probably this is caused by the extreme congestion which prevents drivers from trying to pass. For heavy traffic the lowest accident rates are on divided roads with limited access while the highest rates are on three-lane roads.

At curves and intersections, on two-lane roads, the accident rate decreases as the traffic increases. This effect has been well substantiated, but the reason for it is not entirely clear. Probably the two-lane curves and intersections carrying heavy traffic are plainly hazardous to the average driver and he

becomes more cautious and thus reduces the probability of an accident.

Sharp curves have higher accident rates than flat curves and this difference increases with the traffic volume. Wide pavements and shoulders decrease the accident rate on two-lane curves. However, they do not seem to have any influence on two-lane tangents.

The percentage of cross traffic at an intersection has a great influence on the accident rate at the intersection. Only about 15 percent of cross traffic is needed to make an intersection twice as hazardous as when

the traffic is well below 10 percent. Three way intersections (T and Y) have much lower accident rates than four way intersections. In most cases not much can be done about this.

Wide roadways at bridges and underpasses on two-lane pavements reduce the accident rate. The additional width over that of the pavement should be from 4 to 8 feet. Underpasses are more dangerous than bridges.

Several roadway features did not appear to have any consistent effect on accident rates. They are

grade, pavement and shoulder widths on tangents, frequency of curves, frequency of sight restrictions, and the percentages of commercial and night traffic.

• • •

### The Highway Program of Wayne County, Mich.

CONSTRUCTION during 1952, in this county surrounding Detroit, was again highlighted by extensive asphaltic resurfacing of existing highways. Approximately 1.1 million square yards of old cement-concrete pavements were rehabilitated by resurfacing with asphaltic concrete. This is approximately 65 per cent of the total for 1951 of 1¾ million square yards, which will probably stand as a record for some time. The average year's resurfacing program in the future should not reach such a volume if funds are available to resurface old pavements before serious disintegration takes place. Unfortunately, that has not been the case, and it was only by emergency financing and the recent increase in gasoline tax that this Board was able to meet that crisis. The turning point was reached in 1951, however, and barring unforeseen circumstances in the future, this problem will be handled on a normal basis.

Having passed the peak in the emergency referred to above, the Board is looking forward to an expansion of its highway facilities to meet a new crisis; namely, congestion. Record vehicle registrations, coupled with increased use of the automobile, have filled many highways far beyond their capacity. Our accelerated resurfacing programs received first priority in the past three years but that did not overcome this problem. Resurfacing restores the original highway but does not increase its width. Thus, the capacity of Wayne County's highways has remained the same for many years. With rapidly mounting traffic values, it becomes most urgent that this problem be given the next order of priority. Consequently, as resurfacing of existing highways levels off, an increase in new construction and widening will be forthcoming.

The problem of highway congestion has already been given some attention by this Board in another manner, although the benefit may not be readily seen as yet. In 1951 and 1952, a bituminous surface was

If Noah had known about...



# Pekrul

*Gates*

his water control problems might have been easier. There's where **you** have the advantage over poor Noah. PEKRUL Water Control Equipment and PEKRUL engineers stand ready to solve your most difficult requirements.

Manufacturers of Pekrul Gates for

FLOOD CONTROL  
LEVEES  
IRRIGATION  
WATER WORKS  
DAMS  
SEWAGE DISPOSAL  
RESERVOIRS  
PUMPING PLANTS  
OIL REFINERIES  
FISH HATCHERIES  
REARING PONDS  
RECREATION POOLS  
COOLING TOWERS  
STEEL MILLS

PEKRUL GATE DIVISION

Write for Catalog 49

## MORSE BROS. MACHINERY

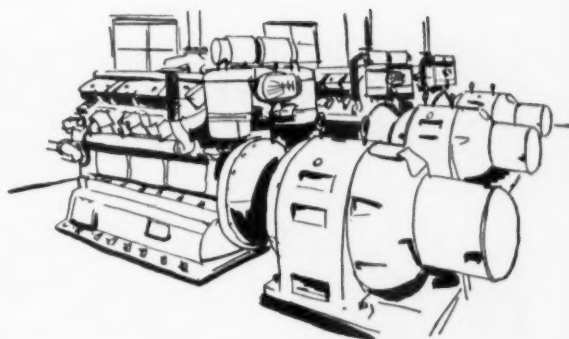
DENVER, COLORADO

Thousands use our Readers' Service card to keep up to date... do you?

We've claimed Cat\* Engines and Electric Sets are rated for *honest* HP and KW—that they give you smooth, steady performance—handle overloads without stalling—operate with practically no supervision and use low-cost No. 2 furnace oil without fouling.

We've claimed that your Caterpillar Dealer backs them up with prompt, on-the-spot service.

We've claimed they will last longer—and do more work with less down time than any other unit.



# NOW MAKE US PROVE IT!

Your Caterpillar Dealer is ready to give you facts and figures—show you public power installations—provide a list of owners you can talk to. He's as near as your phone. Call him today!

CATERPILLAR, Peoria, Illinois.

## CATERPILLAR\*

\*Both Cat and Caterpillar are registered trademarks - ®

**DIESEL ENGINES  
AND ELECTRIC SETS**

placed on more than 50 miles of newly reconstructed stone-base highways. These roads are being used by more and more motorists and, as a consequence, the concrete highways parallel to them are relieved. The new butuminous surface is constructed 22-feet wide with gravel shoulders on each side, and its riding quality is very good. These roads will become more attractive for through traffic when the public learns that travelling time may be shortened and that it is possible to avoid the congestion

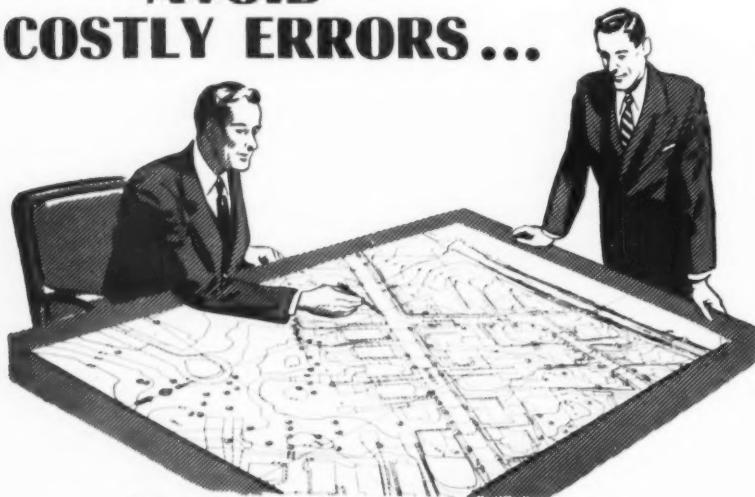
that is present elsewhere. This program will be extended as rapidly as stone-base construction is completed.

With further regard to our resurfacing existing cement-concrete pavements with asphaltic concrete, before placing the asphaltic concrete on the old surface, all disintegrated cement concrete is removed and badly fractured sections are replaced. Where drainage difficulties exist, they are corrected and all utility structures in the pavement are adjusted to the new grade.

Where there are no curbs, gravel shoulders are brought up to the grade of the new surface with additional gravel. Almost all such resurfacing was the standard 2-inch thickness which includes a one-inch binder course and a one-inch surface course. Each layer is laid separately. The binder course is applied throughout before the finish course. Traffic was maintained during construction.

This is from the 1952 Annual Report of the Board of County Road Commissioners, Wayne County, Detroit, Michigan. John K. Norton is engineer of Highways and George J. Barr is Field Engineer.

## AVOID COSTLY ERRORS...



### Map your project out in advance

No matter whether you're laying a pipeline across open country or planning a teeming city's newest subdivision, the first thing you must have is reliable map information.

You'll find air photographs, photo maps and/or topographic maps indispensable in avoiding expensive and unnecessary errors on any engineering project, large or small.

So why not play safe? Let a representative of Jack Ammann Photogrammetric Engineers work with you from the very start of your original planning.

He will be glad to assist you in every way, and his expert counsel is your best assurance that your maps will meet your every requirement at the lowest possible cost.

Avoid costly mistakes. Map your project out in advance the Jack Ammann way and be certain you're RIGHT from start to finish.

**Jack Ammann**  
PHOTOGRAMMETRIC ENGINEERS  
BROADWAY AT TENTH - SAN ANTONIO 5, TEXAS



Eastern Office: 32 Hillcrest • P. O. Box 411 • Phone Manhasset 7-1840 • Manhasset, N. Y.

Get full details of this month's new products... mail your Readers' Service card today.

### Communications on the New Jersey Turnpike

To keep traffic moving on the 118-mile length of the New Jersey Turnpike the police, administration personnel, highway maintenance men, customer service stations, and entrance and exit personnel, utilize five very high frequency radio stations, seven microwave stations, 75 mobile units and 86 toll booths at the 17 interchange stations.


Many complex and novel problems were solved before satisfactory communications could be established as the turnpike lies in the shadow of two great broadcasting centers, New York and Philadelphia, where the atmosphere is filled with hundreds of broadcasting signals from police and commercial broadcasting sources.

A special 2-element, directive reversible car-top antenna is used. The effect of the antenna pattern reversal is about the same as moving the vehicle instantaneously about four miles up or down the highway, depending upon whether the switch is in either the "fore" or "aft" position. It is thus possible to dodge the area of interference and obtain relatively clear communications.

### Aluminum Pipe for Temporary Water Service

About 2200 ft. of 6-inch aluminum pipe, of the type used for irrigation, was purchased and laid on the ground surface to relieve a pressure problem. This was used in an area during the time that a permanent pipe line was being laid through a section where ledge rock slowed the work. Fred E. Thrall, Ass't. Sup't., Water Department, Manchester, Conn., reported this to us.



<p><b>VICE PRESIDENTS</b>  <b>MILTON OFFNER</b>  <b>EDWARD P. DECHER</b>  <b>RALPH C. GRAHAM</b>  <b>WARREN A. COOLIDGE</b></p> <p><b>PAST PRESIDENT</b>  <b>EDWARD J. CLEARY</b></p>	<h1 style="margin: 0;">A P W A</h1> <h2 style="margin: 0;">news</h2> <p>AMERICAN PUBLIC WORKS ASSOCIATION          1313 EAST 60TH ST., CHICAGO 37, ILL.</p>	<p><b>DIRECTORS</b>  <b>J. J. DEAN</b>  <b>SOL ELLENSON</b>  <b>GEORGE G. HYLAND</b>  <b>JEAN L. VINCENZ</b></p> <p><b>TREASURER</b>  <b>ALBERT G. WYLER</b></p>
<p><b>ALLAN H. ROGERS, President</b></p>		<p><b>DONALD F. HERRICK, Executive Director</b></p>



● Part of the group from Indiana, Kentucky and Ohio who attended meeting of Ohio Valley Chapter described below.

## EQUIPMENT SHOW EXPECTED TO BREAK PREVIOUS RECORDS

**National Acclaim for Association's  
Annual Equipment Show  
Oct. 26 to 29th**

**M**EMBERS are once again looking forward to the Annual Equipment Show to be held in New Orleans, October 26-29 in conjunction with the 1953 Public Works Congress. Growing demands for exhibit space indicate that a record number of manufacturers will display their products at the New Orleans Congress. W. O. Jones, City Manager, Fort Worth, Texas, says: "I cannot see how any manufacturer can afford not to show his equipment." Further indication of the enthusiasm members have for the Equipment Show is reflected in the following comments received from all parts of the country. James J. Murray, Supt. of Public Works, Colorado Springs, Colorado, says

(Continued on page 84)

## Edmund Hughes and Robert Sarvis Elected Heads of New Orleans and Ohio River Valley Chapters

Nearly one hundred members and guests from Indiana, Kentucky and Ohio attended the Annual Meeting of the Ohio River Valley Chapter at Dayton, Ohio, June 12. Robert Sarvis, Director of Public Works of Cincinnati, was elected President to succeed Myron Tatlock, Consulting Engineer, Dayton, Ohio. Other officers elected were: Roy Robinson, Dir. of P.W., Lexington, Ky., Vice Pres.; Leo Flotron, Highway Engr., Dayton, Sec.-Treas.; Clarence Windsor, City Engr., Anderson, Ind.; George Fiemeyer, Dir. Pub. Works, Hamilton, Ohio and Ray Finn, Pres., Bodie-Finn Company, Cincinnati, Members of Exec. Committee.

The program included an equipment exhibit, complimentary smorgasbord luncheon, inspection trips to the Price Brothers Concrete Pipe Plant, talks on Financing Public Works and Public Works Administration, Roundtable discussions on Refuse, Street and Traffic Problems and a banquet featuring short talks

by Mayor Louis Lohrey of Dayton and Allen Prichard, Executive Director of the Ohio Municipal League.

## Fifty Attend Meeting of New Orleans Chapter

The New Orleans Chapter met at the Engineers Club in the DeSoto Hotel, New Orleans, June 4 and re-elected Edmund F. Hughes, Civil Engineer of the Sewerage and Water Board as President. Other officers elected were: Charles Casagagne, Administrative Engineer, New Orleans Railway Terminal Board, Vice-President; Robert H. Grehan, Assistant Engineer, New Orleans Public Service Inc., Secretary-Treasurer; Owen V. LeBlanc, of the W. Horace Williams Co., Engineers and Contractors and Thomas J. Rennie Design Engineer for the City of New Orleans were elected members of the Executive Committee. Fifty members and guests from southern Louisiana were present at the meeting.

## Special Assessment Practices and Parking Lot Data Included in New ICMA Yearbook

THE 1953 MUNICIPAL YEARBOOK just published by the International City Managers' Association contains information of special interest to public works officials. The results of nationwide surveys of special assessment practices and trends in the establishment and operation of municipal parking lots are included. A total of 591 of the 712 cities (over 10,000 population) reporting use special assessments for paving, 540 for sewers, 539 for curbs and gutters and 527 for sidewalks. In addition, 180 cities use this method for financing the repairing of streets, 172 for water main extensions, 119 for street lighting and 22 for off-street parking. The front-foot factor is used exclusively by 473 cities to allocate costs to benefiting property owners; 138 use a combination of front-foot and area; 19 use area of the property exclusively; 11 use assessed valuation; 13 use a combination of area, front-foot and assessed valuation; and 16 use a combination of front-foot and value. A total of 359 cities have special rules for allocating costs to corner lots, and 224 assess part of the cost against benefiting but non-abutting property.

The survey reveals that 70 cities established parking lots for the first time during 1952. Municipal parking lots are reported in use in 519 of the 1,126 cities with populations

over 10,000. Of these, 52 percent allow free parking; while 219 cities have parking meters on one or more lots. Sixty-seven cities employ attendants for some lots, most of which charge for parking. Of 429 reporting cities, 45 percent consider parking lot operations a function of the police department and 31 percent place the responsibility in the public works department. Only 3 percent of the cities report having parking authorities. In the remaining 88 cities parking lot responsibility is divided among such officials as finance officers, city engineers, park superintendents and city managers.

### Supply Limited, Order Now

Copies of the 1953 Municipal Yearbook are available from the International City Managers' Association, Dept. P.W., 1313 East 60th Street, Chicago 37, Illinois. Price \$10.00.

• • •

### Equipment Show

(Continued from page 83)

the Equipment Show offers—"An opportunity to inspect and evaluate equipment of various types and makes, and is a real occasion for us so far removed from the industrial centers." Samuel F. David, Director of Public Service, Cleveland, Ohio, writes that the Show—"Is of immense value to me . . . putting us in a better position to decide which equipment meets our particular need . . . an excellent time saver in bringing us up to date on modern equipment." These and other comments from Public Works officials in St. Paul, Minnesota; Los Angeles, California; New York, New York; Tampa, Florida; and other cities indicate that members regard the Annual Equipment Show as one of the outstanding attractions of the Congress. Manufacturers interested in the public works market should certainly not pass up this opportunity to participate in the Association's 1953 Equipment Show.

• • •

### Roadside Vegetative Cover

GOOD vegetative cover can be established by good seeding methods even on poor soils, but the soil fertility level must be adequate. This is the conclusion of the New York State Department of Public

Works following a research project conducted during 1951-52. Good grass cover was established on soils with silt plus clay content as low as 5 percent. Certain soils may be so dense as to prevent root penetration and restrict plant establishment. However, the density of mechanically stabilized soil will not prevent the establishment of good grass cover.

Good cover was established and maintained at pH values from 5.5 to 7.5. Generally pH values below 4.5 have a detrimental effect on the establishment of vegetative cover. Satisfactory stands were obtained at organic matter or humus levels as low as 0.5 percent. Low moisture-holding capacity of a soil limits plant growth unless a good supply of moisture is available. Top soil is usually not essential and costs can be greatly reduced by omitting it. Productive soil on a job should be utilized as far as possible.

Sodding is not essential for erosion control except where an immediate turf cover is required. Planting is not necessary either. Seeding will produce the same results for much less cost. An adequate supply of available plant food is essential for successful plant establishment and continued growth. To provide this many soils require the application of lime and complete fertilizer. A fairly rough seed bed, such as is left immediately after grading without additional tillage, usually meets all requirements for seeding. Rolling is not required for seeding establishments on most soils. On heavy soils it may promote soil crusting.

Grasses as a group are superior plants for roadside vegetative purposes. The low growing, late maturing, leafy perennial grasses which propagate by underground vegetative means are most desirable and require a minimum of maintenance. A seeding method which places the seed in the soil to a depth of from one-quarter to one-half inch is desirable when practical. Fall and early spring seedings give best results. Mulch, when employed at a light rate on surface seeding, gives results equivalent or better than many soil-covered seedings.

Additional fertilizer is often necessary as a maintenance measure. When that need is indicated by the appearance of the vegetation, fertilizer should be applied in amounts sufficient to supply the deficiency but not enough to cause heavy top growth. Except where required for safety, snow drift control, or appearance, slopes should not be mowed.

### Film Of The Month

"A Community Problem" is the name of an excellent 16 min. film produced in 1951 by the Caterpillar Tractor Company. This 13-minute sound film, made in color, is available on loan from the Advertising Department of this Company at Peoria, Ill.

The film shows the various types of equipment used in sanitary landfill operations, without mention of the producers company. Other garbage disposal methods are also pictorially described and comparative cost advantages of the landfill method of disposal are presented. This film is particularly suited for showing in many communities that are now considering changing their method of disposal because of newly enacted legislation prohibiting the feeding of raw garbage to swine.

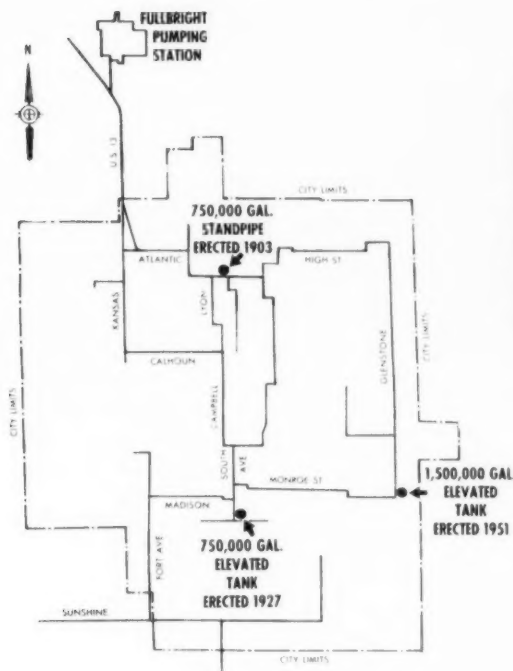
# A GOLDEN ANNIVERSARY

## for

# HORTON\*

# TANKS

### at Springfield, Missouri



Map showing mains 10 in. diam. and larger in distribution system at Springfield, Missouri.

For a half a century . . . from 1903 to 1953 . . . Horton tanks have been helping provide better water service in the city of Springfield, Missouri. It's a record of tried and true performance that speaks for itself.

The first structure built for the Springfield City Water Company . . . and still in service today . . . is a 750,000-gal. Horton standpipe erected in 1903. The second structure is a 750,000-gal. Horton ellipsoidal-bottom elevated tank erected in 1927 and the third, shown above, is a 1,500,000-gal. Horton radial-cone bottom elevated tank erected in 1951. These Horton tanks have helped meet growing seasonal demands in Springfield over a period of five decades.

Perhaps your city's water demand has increased to a point where present facilities are overtaxed. Then write our nearest office today for information on the type of Horton tank best suited to solve your water problems. There is no obligation on your part.

*\*Trade Mark Registered in U. S. Patent Office*

# HORTON

WELDED STEEL  
STORAGE TANKS

## CHICAGO BRIDGE & IRON COMPANY

Plants in Birmingham, Chicago, Salt Lake City, and Greenville, Pa.

Atlanta 3 ..... 2123 Healey Bldg.  
Birmingham 1 ..... 1532 North Fifth St.  
Boston 10 ..... 1038-201 Devonshire St.  
Chicago 4 ..... 2115 McCormick Bldg.  
Cleveland 14 ..... 2221 Midland Bldg.  
Detroit 26 ..... 1536 Lafayette Bldg.  
Houston 2 ..... 2142 C & I Life Bldg.

Los Angeles 17 ..... 1508 General Petroleum Bldg.  
New York 6 ..... 3316-165 Broadway Bldg.  
Philadelphia 3 ..... 1648-1700 Walnut St. Bldg.  
Pittsburgh 19 ..... 3246 Alcoa Bldg.  
San Francisco 4 ..... 1525-200 Bush St.  
Seattle 1 ..... 1339 Henry Bldg.  
Tulsa 3 ..... 1641 Hunt Bldg.

**TAPAX**  
Takes the BANG out of  
Manhole Covers

**INSTALLING  
TAPAX—a matter  
of minutes**



Brush Away  
Dirt & Gravel



Cut Required  
Length



Place Tapax  
sticky side  
down



Replace  
Cover

Write for  
Bulletin No. 11

**JOSEPH G. POLLARD CO., Inc.**  
Pipe Line Equipment  
NEW HYDE PARK, NEW YORK

## LEAVES PICKED UP in 1/2 the time at 1/4 the cost

That's the essence of a report from the Supt. of Public Works in a New York city.

To find out, without obligation, how an Elliott vacuum leaf loader can do the same for you, fill in and mail coupon below today.



**M. A. ELLIOTTE**  
"SUCKER UPPER"

M. A. ELLIOTTE  
5 State St., Troy, N. Y.  
Please send today literature on street vacuum cleaners and loaders.

Name .....  
Title .....  
Address .....

## Washington



## news

Presented in cooperation with the American Public Works Association  
and through the courtesy of the  
Washington Office of the American Municipal Association.

**M**UNICIPALITIES can look forward to receiving priority aid in securing controlled materials for public construction projects after June 30, if shortages develop. In a letter to Randy H. Hamilton, Director of the American Municipal Association's Washington Office, Arthur S. Flemming, Director of Defense Mobilization, promised: "If shortages develop—full consideration will be given to the need for special assistance for defense-attached public construction projects." Cities which experience materials shortage after June 30, 1953, should describe those experiences to the American Public Works Association, which will pass the information along to AMA's Washington Office.

On May 15 the Federal Government revoked the restrictions on electric utility inventories of controlled materials.

### Purchase Rights on Government Power

Soon to be changed is government policy regarding the sale of Federally-produced electric power to municipalities and counties owning electric utilities. Under the old regulations, those local governmental units received priorities on purchase of this power. New regulations are being drafted which will remove this priority position. Private utilities, which last year received 20 percent of the Federally-produced power want a bigger share. Under new rules it will be first-come first-served with power going to the highest bidder, regardless of whether or not the bidder is a public or private utility.

### Sewage Treatment Plants—1952

According to the annual report of the U. S. Department of Health, Education and Welfare, contracts amounting to \$137 million for 515 sewage treatment plants (including interceptor sewers) were awarded by municipalities during 1952. The

cost of the 314 new plants was \$78,-419,556. The remaining \$58,789,133 provided additions, enlargements or replacements to 201 existing plants.

Municipalities of less than 25,000 people accounted for 82 percent of all projects, but less than half (44.6 percent) of all money spent; 93 percent of all new plants and 60 percent of money for new plants; 65 percent of projects covering additions, enlargements or replacements, and 25 percent of the money spent for such projects.

The factor of obsolescence due to wear, population or industry growth, or a combination of these, is continuing to loom large as an element of current growth and future needs. Of the \$137 million expended on the 515 projects, 42.8 percent of the total expenditures and 39 percent of the projects covered additions, enlargements or replacements.

### Street Construction Needs

The magnitude of the street building problem was emphasized by a report just issued by the U. S. Commerce Department showing that motor vehicles registered in the U. S. in 1952 totaled 53,258,570, an increase of 2.6 percent over 1951. (Automobiles registered totaled 43,801,532)—(a 2.6 percent increase over 1951); trucks reached a total of 9,207,897 (a 2.3 percent increase) and buses totaled 240,142 (a 4.2 percent increase).

For the first time a State passed the 5 million mark, with California reporting 5,154,326. Next in number of vehicles was New York with 3,980,527; Pennsylvania with 3,266,830; Texas 3,155,337; and Ohio, 3,021,633.

Motor vehicle travel on roads and streets during 1952 reached the all-time high of nearly 517 billion vehicle miles, a gain of 5½ percent over 1951. Travel was 55 percent greater than in 1941, as compared with a gain of 52 percent in motor-vehicle registrations.



# A WHOLESALER'S REPUTATION...



It has been said that a reputation is built upon a lot of little things.

But, it has also been said that all of the little things can be utterly destroyed by one false step.

That's why wholesalers go out of their way as much as they do. To their neighbors, they are helpful, friendly, civic-minded. To their customers, they consistently

offer the finest products coupled with experience based upon years of accumulating information on "how to do it."

As a result, they maintain a high position they can be proud of. One they guard zealously. And one that they make certain nothing can destroy.

One type of insurance is the product they handle. They find that by stocking only high-quality products, nothing can go awry. They know that a recommendation based upon those products is the best thing they can offer their customers.

That's why we are so proud of our standing with wholesalers. When you hear one suggest Wolverine copper tubing, you can be sure that it is because he himself is sold—by year after year of trouble-free performance.

**WOLVERINE TUBE DIVISION**  
of Calumet & Hecla, Inc., *Manufacturers of tubing*, 1451 Central Avenue, Detroit 9, Mich. Plants in Detroit, Mich. and Decatur, Ala.



## Water Treatment Plant Waste Disposal

(Continued from page 73)

of waste from lime-soda plants as for purification plants, with three additional possibilities: (1) recalcining the sludge; (2) utilization of carbonate sludge as a precipitant in primary sewage treatment plants; and (3) dewatering, drying, and pulverizing with sale of the final product to industry.

In Ohio there are only three plants, of a total of 127, that dis-

charge wastes to sewers which in turn drain to a sewage treatment plant. Apparently this method has not proven satisfactory. While some localities have reported such waste as beneficial in that it kept the sewage fresh, reduced odors and improved clarification, the digester sludge has been almost impossible to handle. It is understood that one city abandoned the method in favor of lagoons. The details and reasons for the change are not known. In Ohio approximately 50% of the water softening plants discharge the wastes to sludge beds, or lagoons.

Such a method, when properly handled so as to prevent breaks and discharge into the stream at periods of low flow, is fairly satisfactory. However, large areas are required. A minimum of trouble and nuisance is encountered; but occasionally, if a heavy plankton load or other organic matter is present in the water, disagreeable odors occur as decomposition takes place. Lagooned lime-soda sludge has been disposed of and used in a number of unusual ways which may be of interest. It has been used as trench backfill to protect water mains from external corrosion; and it has been used by farmers in either of two ways: As dried sludge obtained by vacuum filtration, or as wet sludge applied direct to the land.

The disposal of lime-soda plant wastes into streams usually is objectionable from the silting and aesthetic standpoints. However, such waste does not have any oxygen absorbing qualities and the chemicals are inert, and hence they are not ordinarily classed as pollutants. This method, while perhaps the easiest and most economical, is not as satisfactory or as free from complaints as some of the other methods.

Three additional methods of disposal appear to offer attractive possibilities. The first of these, recalcining the sludge, has been slow in development due to the low efficiency of rotary kilns for small scale operation, the efficiency being directly proportional to the amount of material being handled. Further, such kilns are a major item of expense, and require considerable operating supervision. Hence they are suitable only for large plants. Multiple hearth furnaces for calcining are expensive to maintain. Calcining furnaces which appear to have solved the problem for the small plant have been designed recently and are being tested. It appears that such furnaces will be able to produce a lime high in available CaO—from 89 to 93%.

In actual practice 100 per cent recovery is not obtained but usually more lime is produced than is required for the softening process. One pound of lime added to the water produces 3.57 pounds of sludge, which is dried and calcined to 2 pounds of lime. The build up of Mg is prevented by two methods: (1) Split treatment, precipitating Mg separately from Ca; and (2) physical separation in the centrifuge during dewatering.

Another method is the employ-

## It takes a **FULL** team

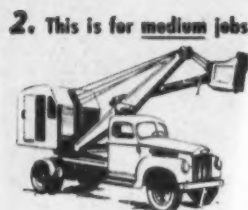
... whether it's mountain climbers



... or digging equipment



1. This is for big jobs



2. This is for medium jobs



3. Sherman for all other jobs

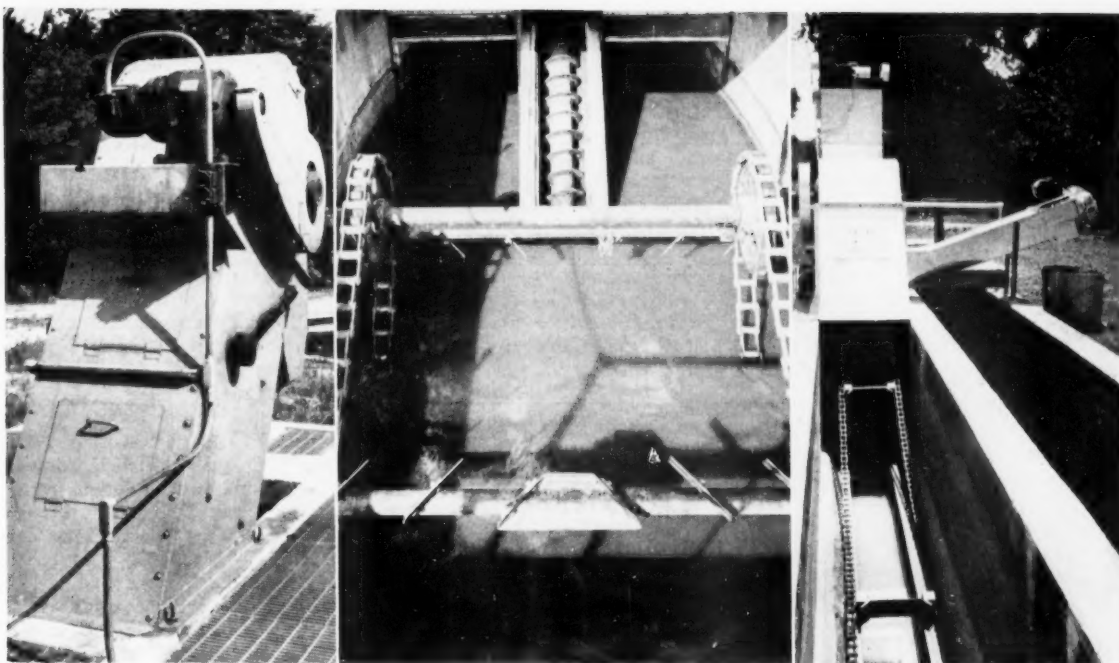
On many excavating jobs the use of big equipment is costly and time-consuming. The Sherman Power Digger is designed so that you get all the advantages of power digging on these jobs. Thousands of users have proved that the Sherman Power Digger reduces costs. Write today for descriptive literature N44.

**Sherman**  
PRODUCTS, INC.  
ROYAL OAK, MICHIGAN



Designed, Engineered and  
Manufactured Jointly by  
SHERMAN PRODUCTS, INC.  
Royal Oak, Michigan  
WAIN-ROY CORPORATION  
Hubbardston, Mass.

Patent No. 2,303,825  
Other patents pending



**TRITOR SCREENS**—At small sewage treatment plants—where grit creates a problem during storm flows, this one machine accomplishes the effective, low-cost removal of both screenings and grit.

**STRAIGHTLINE GRIT CHAMBERS**—For the removal of a clean, washed grit with a low putrescible content. The complete collection and thorough cleaning operation makes further handling unnecessary.

**STRAIGHTLINE GRIT COLLECTORS**—On this bucket type collector, water sprays wash the grit from the buckets into a separate washing and dewatering screw. Photo also shows Link-Belt Bar Screen.

## How to get flexible, low-cost grit removal

### LINK-BELT can give you equipment best suited to your requirements

**D**ON'T let grit plug your pipe lines . . . wear out your pumps . . . take up valuable space in your digesters. Link-Belt builds effective grit removal equipment that assures both low costs and flexibility.

For example, with the Tritor Screen, a grinder may be used to shred the screenings when no grit is received. During storms, the grinder may be by-passed and grit and screenings disposed of by fill, burial or incineration. Similarly, the Straightline grit collector is designed either with a pitched flight collector and dewatering and washing screw discharging direct from the grit chamber—or with a bucket type collector for deep chambers.

In addition to grit handling and washing equipment, Link-Belt manufactures a complete line of equipment for water, sewage and industrial waste treatment plants. A call to the Link-Belt office near you will put you in touch with an experienced sanitary engineer. He'll work with your engineers, chemists and consultants—help you get the best in modern treatment equipment.

**LINK-BELT COMPANY:** Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities.

13-134

**LINK-BELT**

**SANITARY ENGINEERING EQUIPMENT**

ment of the lime-soda plant wastes as a chemical coagulant in sewage treatment plants. Plant experiments and studies at Daytona Beach, Florida, indicate a BOD reduction of approximately twice that of a conventional primary treatment plant, and at a much lower cost. The adaptability of this process is limited by plant location and sewage characteristics.

The dewatering, drying and pulverizing of lime-soda plant sludges with the sale of the dried product for a variety of industrial uses appears to have good possibilities. This

was tried by the Wright Aeronautical Company with some degree of success.

What are the prospects for the future? The only real solution to the problem appears to be either to dewater and dry the sludge and then to dispose of it commercially, if a market can be found; or to go one step further and calcine it, reclaiming the lime for use in the softening process and selling the excess lime so produced. As reported by an AWWA Committee, studies indicate that the lime thus produced generally will cost no more than com-

mercial lime even when no credit is taken for the value of sludge disposal or the carbon dioxide produced and used in the softening process.

### Zeolite Plant Wastes

Wastes from zeolite water softening plants consist of wash water containing waste products of the regeneration cycle plus unused salt. The wash water will contain chlorides proportional to the amount of salt used in regeneration usually from 0.25 to 0.50 pound per 1000 grains of hardness removed. Wash water approximates from 5 to 10 percent of the amount of the water treated.

Fish may be killed if brine is released and travels downstream in a slug. Limiting concentrations are not definitely known but may be from 5000 to 10,000 ppm for short periods, depending upon the species. Indications are that a salt content of 1.5 percent should be considered the upper limit for stock water, with a somewhat lower limit for lactating animals. Brine wastes, unless quickly diluted, will kill vegetation.

Chlorides cannot economically be removed from the wastes and thus damage to water supplies from salt wastes is irreparable.

Dilution, of course, is a method of disposal. This should be controlled in some fashion to prevent chloride concentrations that would be injurious to fish, animals, or vegetation. Reservoirs may be needed to accomplish discharge at the proper rate to prevent damage.

Ponds for evaporation of water and retention of the salt do not appear to offer a satisfactory means for disposal of the brine wastes. Solar evaporation rates may be less than rainfall rates. Then too, there is danger of seepage and contamination of the soil, underground water and surface water.

Brine disposal wells may offer a means for handling these wastes. However, the wells would normally have to be quite deep and the brine pretreated before pumping into the well to prevent suspended matter from plugging the pores of the formation. Such wells would have to be constructed carefully to avoid contamination of fresh water. There are some 32 zeolite plants in Ohio discharging wastes to streams. There have been several cases where live stock have been affected.

This article is based on a paper presented by the author at the meeting of the Ohio Section, American Water Works Association.



## NEW...DIFFERENT...

### PLASTIC BASE JC-60

### CUTS SEWER SYSTEM COSTS

THESE ARE THE FACTS: JC-60® cuts sewer line maintenance costs. Joints poured with ATLAS JC-60 resist the common causes of sewer joint failure — root penetration, climate extremes, normal settling, loss of adhesion and chemical attack.

*Operating costs* go down. By reducing infiltration of soil water, JC-60 sewer joints reduce pumping costs and equipment capacity required at the disposal plant.

*Installation costs* go down. JC-60, with minimum shrinkage, high fluidity and resistance to overheating deterioration speeds the entire jointing procedure and minimizes material waste.

Years of ATLAS research created this remarkable new jointing compound. Based on a synthetic plastic, JC-60 is designed specifically to provide those characteristics proved most desirable in actual use.

COMPLETE FACTS are in Bulletin M20-3 and other technical literature. Write for your copies.



OTHER ATLAS JOINTING MATERIALS include GK® and SLIPJOINT GK® for sewer pipe; MINERALEAD® and HYDRORINGS® for cast iron water pipe.



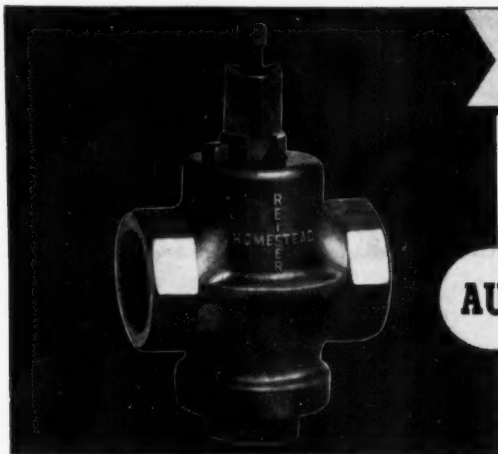
ATLAS JOINTING COMPOUNDS

... a permanent bond

Engineering Representatives Throughout the United States

Thousands use our Readers' Service card to keep up to date... do you?





Semi-Steel or Cast Steel Threaded or Flanged Ends

**THESE VALVES... HAVE CURED**

**A LOT OF MAINTENANCE**

**HEADACHES, because they...**

**AUTOMATICALLY ADJUST FOR WEAR**

Wear, that in most valves would cause leakage and necessitate complete valve renewals, simply doesn't faze a HOMESTEAD-REISER.

Its two-piece, wedge-acting plug constantly and automatically adjusts itself to make up for wear as wear occurs. The valve acts on its own. *It is SELF-SEALD!*

Result: Extra long, leakless service life . . . more operations between lubrications . . . less maintenance . . . lower plant operating costs.

Available in semi-steel or cast steel; 100% port area or Venturi type; sizes 1/2" to 14" for steam working pressures to 150 lbs.; or oil . . . water . . . gas to 200 lbs.

Write today for VALVE REFERENCE BOOK No. 39. No obligation. Consult Yellow Pages of Phone Book for local Representative.



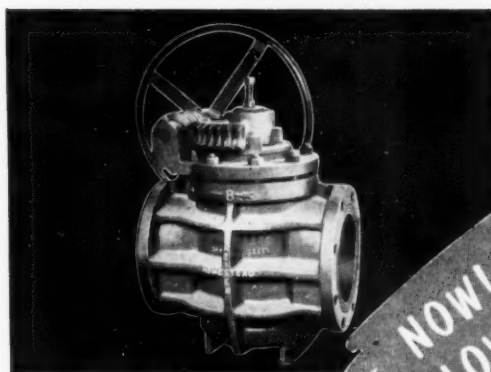
**NOW! AT NEW LOW PRICES!**

**HOMESTEAD**  
VALVE MANUFACTURING CO.

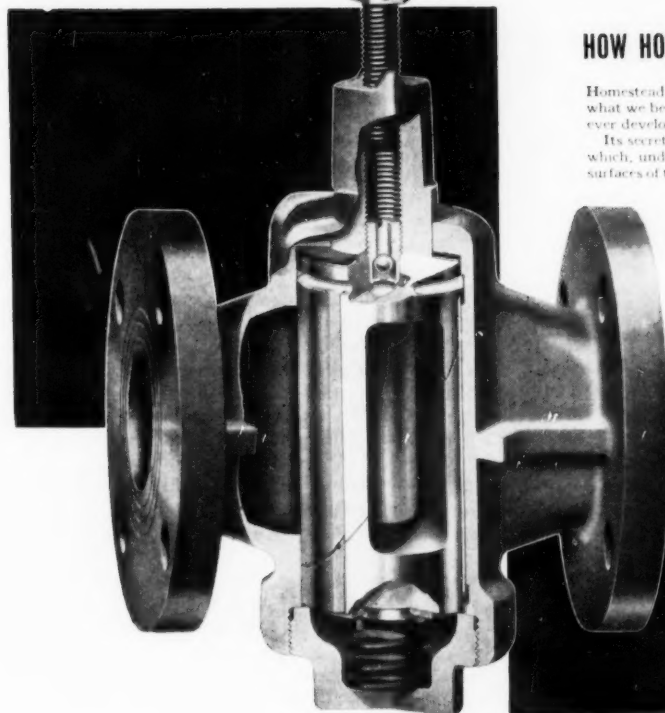
P. O. BOX 40

"Serving Since 1892"

CORAOPOLIS, PA.



Worm and Gear Operated



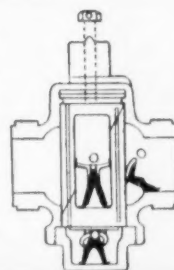
### HOW HOMESTEAD-REISERS SEAL THEMSELVES

Homestead-Reiser's self-sealing action is based on what we believe is the most effective sealing principle ever developed for lubricated plug valves.

Its secret is the wedge-action of the two piece plug which, under line pressure, causes the finely finished surfaces of the plug to press outward against the body.

A full lubricant seal surrounds the ports, and the top and bottom of the valve.

The self-sealing, wedge action keeps the plug surfaces in constant contact with the mirror-like bore of the body. It provides automatic adjustment for wear and assures extra long valve life with maximum leakless service.



**HOMESTEAD-REISER**  
*Self-Seald...Lubricated*  
**PLUG VALVES**

Need more facts about advertised products? Mail your Readers' Service card now.

# PUBLIC WORKS

# DIGESTS

## THE WATER WORKS DIGEST

### Plastic Pipe For Water Services

In 1951 the Pacific Gas & Electric Co. tested cellulose acetate pipe with the idea of using it for water services. It was found to be resilient under slowly changing stresses at temperatures between 32° F and 95° F; brittle under impact stresses; to have high resistance to bursting stresses; and subject to plastic flow under sustained load at temperatures above 95°. When the unfavorable factors were balanced against freedom from corrosion, lightness in weight, ease of jointing and of handling, a substantial field trial seemed justified. Similar tests were made on "Tenite II" plastic tubing, and its physical properties were found to be excellent especially those involved in making field connections, and it was adopted by the company for services; 300 had been installed by October 1952. They have been found to be cheap, with a saving of about \$5.50 for a 25-ft. service. They have given no trouble except when attempts by plumbers or unauthorized persons to turn the shutoff cock have caused the tubing to be twisted off. Although plastic tubing looks promising, only time will determine the extent of its usefulness.

"Plastic Pipe for Water Services," by John N. Spaulding, Gen'l Supt. of Water Systems, Pacific Gas & Elect. Co. *Journal, Am. W. W. Ass'n*, May.

### New York's Specifications For Fluoridation

New York State has revised its requirements for water fluoridation equipment and facilities. The fluorine compounds acceptable for the fluoridation of public water supplies are commercial sodium fluoride, sodium silicofluoride, ammonium silicofluoride and hydrofluosilicic acid; provided ammonium

silicofluoride is not used in the treatment of a water supply which also is chlorinated. The use of granular compounds is advocated to minimize dust when handling. The chemicals should be stored in covered or unopened shipping containers. Hydrofluosilicic acid must be stored in unopened glass carboys or rubber-lined containers. The bins of chemical feeders should be large enough to hold one day's supply. Feeder accuracy should be within approximately 5 percent. Where the rate of water treated varies more than 10% from the normal, proportional feeders should be used. Slurry of sodium silicofluoride must not be fed with solution feeders. Dry feeders of either the volumetric or gravimetric type are acceptable. Ample solution should be provided. Operators who handle fluoride compounds should be provided with rubber gloves, dust respirators and rubber aprons. Several alternative methods for control of dust, gas and vapors are described. Records must be recorded daily of amount of water treated and of the weight of the fluoride compound applied, and of analyses for fluoride ion content of the water.

"Fluoridation Equipment and Facilities;" *PUBLIC WORKS*, June.

### Sand and Anthraflit Compared

Six years ago the Lawrence, Kans., water department rebuilt four rapid sand filters, two with 26" of Mississippi river sand as a filter medium and two with 26" of No. 1 anthraflit. Each has 12" of identically graded gravel on Wheeler filter bottoms. For six years all four filters have received the same lime- and soda ash-treated water. The sand filters have been washed at the rate of 23" of water rise per min., the anthraflit with 16" rise, each giving 50% expansion. The greater rate has produced some blow holes

in the sand, but none has appeared in the anthraflit. There has been no apparent difference in quality of effluent water between the two types.

The loss of anthracite due to backwashing has been less than 0.6% per year. With anthracite, the filter runs have been longer, there is no disturbance of the gravel beds, the filter medium keeps cleaner and does not coat with lime deposits as rapidly as sand.

"Sand and Fine Coal Compared for Water Filtering;" by Robert Mounsey, Water Supt. *American City*, May.

### Materials for Handling Chemicals

The author discusses materials for handling alum, iron sulfate, activated silica, alkalis, chlorine and fluorides. Rubber is excellent for lining tanks, piping and other items of equipment, having excellent resistance to water-treating chemicals. There are no temperature restrictions on the use of rubber compounds. When used for lining pipe, the thickness of the rubber is generally 1/8 in. in small pipe to 3/16 in. in the larger sizes. A high-solids-content liquid neoprene material can be used to coat equipment by brush or spray application. It is not as good as a sheet-rubber lining, but is more available and can be used to repair damaged natural rubber linings, and makes a good lining for wood stave tanks. Plastic piping is being widely used in place of metal piping, especially when low pressure and moderate temperature are involved. Polythene pipe and tubing have proved reasonably satisfactory for handling many chemical solutions, but they must be supported continuously. "Uscolite" thermoplastic is available in rigid piping, considered suitable for pressures up to 100 psi; it threads readily. Nonplasticized rigid polyvinyl chloride thermoplastic materials are available as piping of 3/8 to 6 in.

diameter, with test strength of 2,000 psi, chemically resistant to all the solutions involved. Such pipe can be threaded and installed like steel, except that better support is required.

"Materials for Chemical Handling Equipment;" by L. R. Honnaker and M. L. Monack, of E. I. du Pont de Nemours & Co. *Journal, Am. W. W. Ass'n*, May.

### Evaluating Water Requirements

The demand for water in a given area depends chiefly on the population and industrialization. A common method of forecasting population is projecting births and deaths. But with the great mobility of population in the United States as better jobs present themselves, forecasting future populations is almost entirely a problem in economics, rather than in biology, on determining possibilities for growth in the "economic base." This base consists of industries that use local resources to produce goods and services which can be sold outside the area. Industries producing goods and services that are consumed only within the area do not create economic activity to the same degree as industries producing for wide distribution. The latter are called "basic industries," and each employee in such industry supports one or more citizens in service industries. A ratio of basic employees to the citizens who serve them, for each industry, indicates what growth in population may be expected from an estimated growth in that industry.

"Evaluating Water Supply Requirements for a Region;" by John R. Stockton, Dir., Bureau of Business Research, Univ. of Texas. *Journal, Am. W. W. Ass'n*, May.

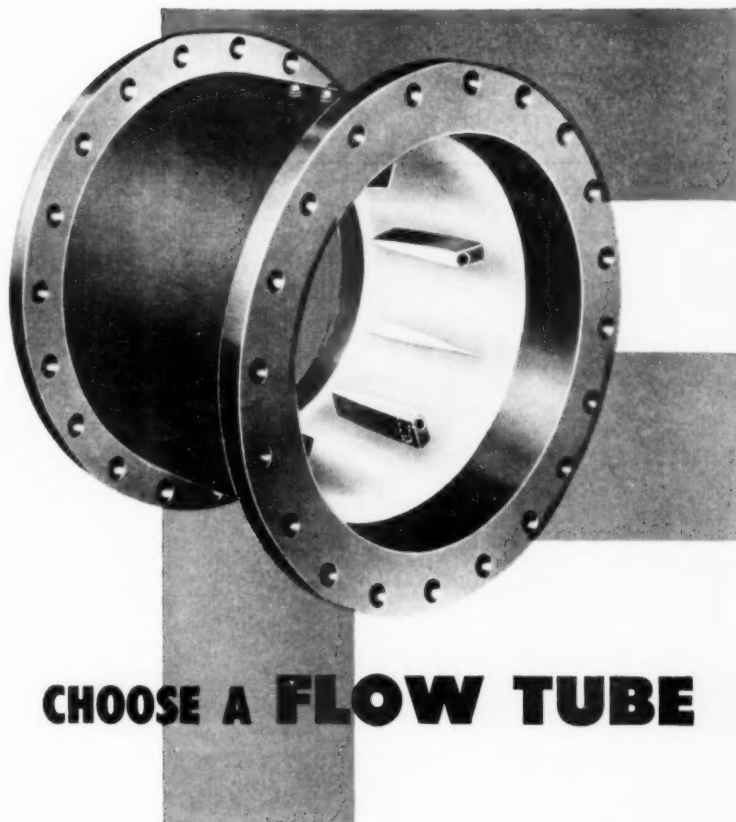
• • •

### Controls Might be Relaxed on Bathing Water Quality

**B**ASED on studies at several bathing beaches and pools, A. H. Stevenson of the Public Health Service, concluded that some of the strictest bacterial quality requirements for natural bathing waters might be relaxed. The report was made at the recent meeting of the APHA.

The studies were conducted on (1) two Chicago beaches on Lake Michigan; (2) the Ohio River at Dayton, Ky., and a fresh water recirculation pool in the same area; and (3) the beaches at New

## FOR ACCURACY IN METERING



## CHOOSE A FLOW TUBE

Flow Tubes are furnished with head capacity curves based on laboratory tests. For unusual piping arrangements, special tests can be run simulating actual conditions. The data furnished with each Flow Tube makes exceptional metering accuracy possible.

Flow Tubes have many other plus values — they're compact, comparatively light weight, and are easy to install since they require minimum straight runs entering and following. And, Flow Tubes are available in types and D/d ratios to provide differentials that can be accurately measured with the least head loss.

That's why Flow Tubes are being successfully used in scores of installations metering the flow of liquids and wet or dry gases. Available in all pipe sizes and suitable metals. They can be furnished with or without suitable secondary indicating, recording or totalizing instruments. For further information, write for your Flow Tube Data File. For specific recommendations, send us necessary flow data.



PRESSURE REGULATORS • RELIEF AND BACK PRESSURE VALVES • CUSHION CHECK VALVES • FAN ENGINE REGULATORS • PUMP GOVERNORS • TEMPERATURE REGULATORS • FLOAT AND LEVER BALANCED VALVES • NON-RETURN VALVES • VACUUM REGULATORS OR BREAKERS • STRAINERS • SIRENS • SAFETY VALVES • FLOW TUBES

**FOSTER ENGINEERING COMPANY • UNION, N. J.**

Rochelle and Mamaroneck, N. Y., on Long Island Sound. Families in these areas were furnished a calendar record form on which they recorded daily swimming and illness experience. Water quality determinations were made on samples collected from the selected swimming areas at intervals necessary to observe significant fluctuations.

In virtually every instance the illness incidence among swimmers was higher than that among nonswimmers (those not going swimming during the study), an expected finding inasmuch as water is an abnor-

mal habitat for man regardless of its bacterial quality.

In the comparison of illness incidence among swimmers with that among nonswimmers, no significant correlation was observed which could be attributed to swimming in natural waters of different quality at the areas studied.

Illness incidence among swimmers under 10 years of age was some 100 percent higher than for those over 10 years of age.

More than half of the illnesses among swimmers were eye, ear, nose, and throat ailments; about

one-fifth was gastrointestinal disturbances; and the remainder were skin irritations and other illnesses.

Specific correlations between illness incidence and bathing in waters of a particular bacterial quality were observed in two instances. In one, a significant increase in illness incidence was observed among swimmers when the water had an average coliform content of 2,300 organisms per 100 ml. over the illness incidence when the average coliform content was 43 per 100 ml. The observed increase could occur as a result of chance but once in 50 trials. This evidence, however, should not be taken as conclusive since only 3 days were selected for study in each instance.

The second instance of positive correlation was observed in the Ohio River study where it was shown that, despite a relatively low incidence of gastrointestinal disturbances, river swimming water having a median coliform density of 2,700 per 100 ml. appears to have caused a significant increase in such illnesses among swimmers. This result, the author noted, must also be treated with caution because of the small number of cases involved.

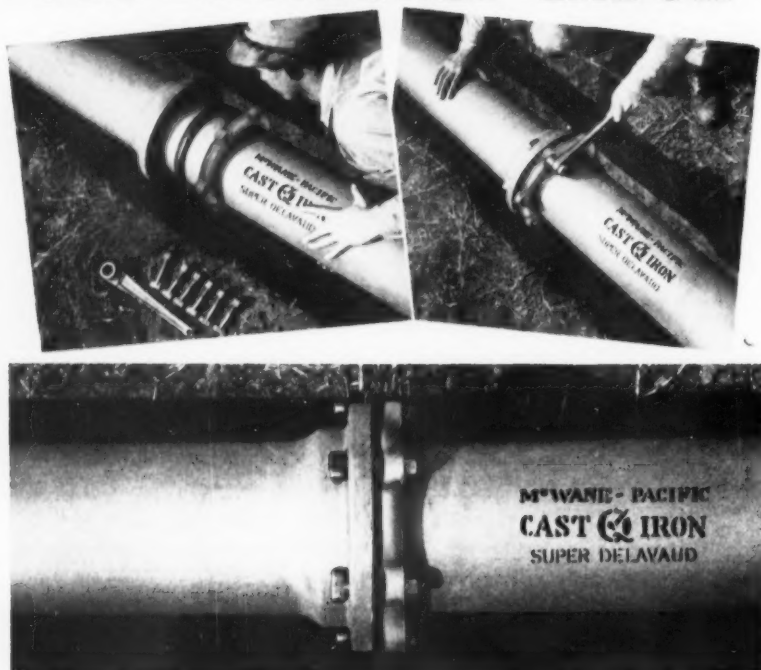
• • •

## Cloud Seeding

(Continued from page 61)

being droplet or ice crystal formation by a process known as nucleation and second, the growth and coalescence of ice crystals or drops thus produced until their weight is sufficient to enable them to fall through the airstream transporting them. Silver iodide and dry ice have been used as nucleating materials. The former is very effective if introduced into rising air currents from the surface of the earth. The dry ice must be dropped from aircraft and is less efficient. Silver iodide is an effective nucleating agent in cloud formations having temperatures from  $+50^{\circ}$  F to  $+27^{\circ}$  F or roughly between elevations 12,000 and 17,000 ft. on summer days in the U. S. In general artificially induced precipitation may be greater in winter than in summer because greater proportions of the cloud mass exist at sub-freezing temperatures. On some occasions the ratio of induced to natural precipitation has been as high as 10 to 1 in the winter in the U. S. However, in summer in the tropics 15 to 20 per cent increase in precipitation is more common.

## USE UNTRAINED LABOR



## McWANE-PACIFIC Boltite PIPE

One man can assemble and make up Boltite mechanical joints. He needs no special skill or training. He needs only one tool—a ratchet wrench. All he does is socket the spigot in the bell, slip the gasket into the stuffing box thus formed, then tighten the bolts of the follower-ring or gland. This simple procedure in joint making saves time, saves labor, saves money.

Boltite is an ideal mechanical joint for water or gas, steam, oil, chemicals or other liquids. Gaskets are furnished of materials to suit the service required. Boltite joint parts are interchangeable with any make of Standardized Mechanical Joint for Cast Iron Pipe. For further details, write

### McWANE Cast Iron Pipe Company Birmingham, Ala.

Pipe Sizes 2" thru 12"

#### Sales Offices

Birmingham 2, Ala. .... P. O. Box 2601  
Chicago 1, Ill. .... 333 North Michigan Ave.  
New York 4, N. Y. .... 83 Broad Street  
Kansas City 6, Mo. .... 1006 Grand Avenue  
Dallas 4, Texas. .... 1501 Mercantile Bk. Bldg.

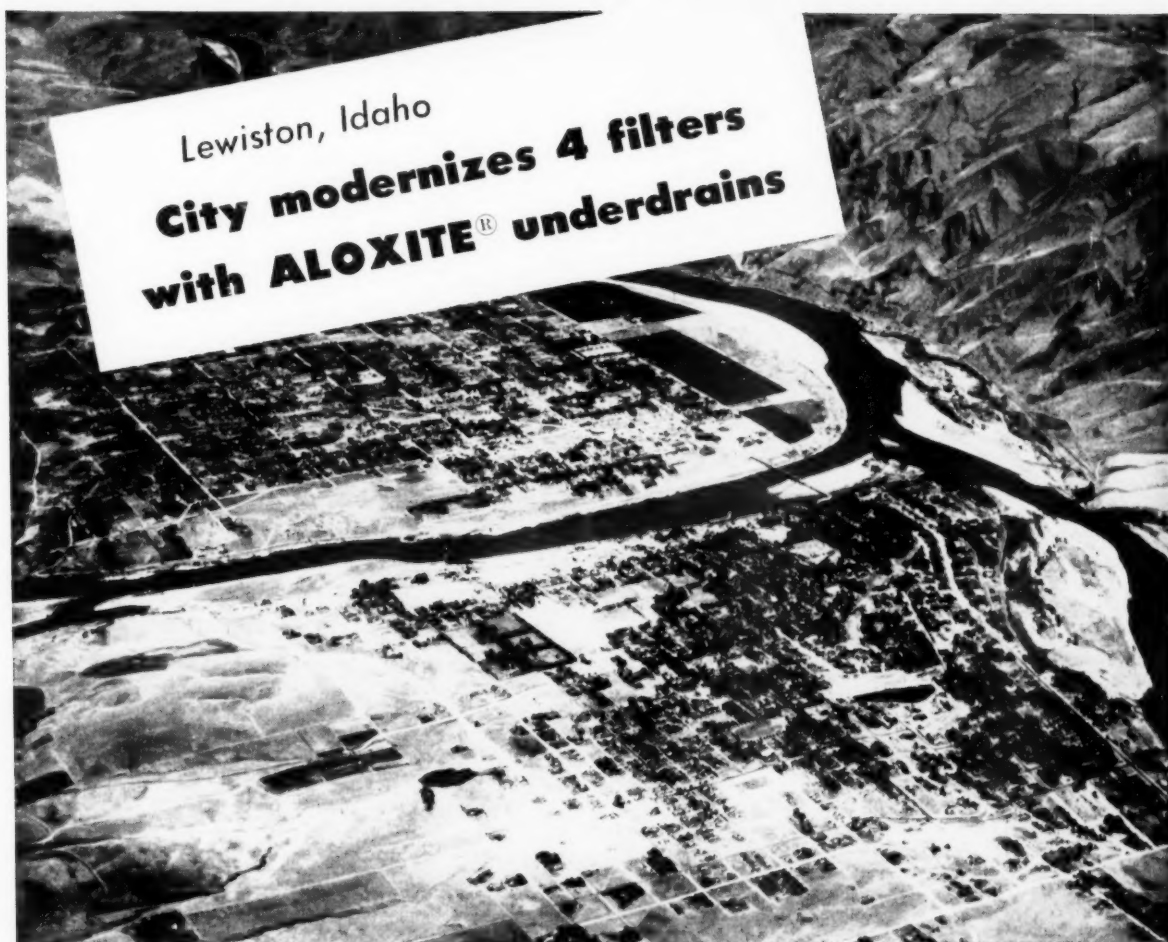
### PACIFIC STATES Cast Iron Pipe Co. Provo, Utah

Pipe Sizes 2" thru 24"

#### Sales Offices

Provo, Utah. .... P. O. Box 18  
Denver 2, Colo. .... 1921 Blake Street  
Los Angeles 48, Cal. .... 6399 Wilshire Blvd.  
San Francisco 4, Cal. .... 235 Montgomery St.  
Portland 4, Oreg. .... 901 Portland Trust Bldg.  
Salt Lake City. .... Waterworks Equip't Co.  
Seattle, Wash. .... Smith Tower Bldg.





Information courtesy Lewiston Water Dept., Lewiston, Idaho. Photo shows Lewiston in the foreground and Clarkston, Washington in the background across the Interstate Bridge.

Lewiston, Idaho has four filters. Installed in 1924, these were originally of the conventional type with pipe lateral underdrains and graded gravel. First in 1934, and again in 1950 they required rebuilding. The beds were badly upset, the laterals clogged and corroded.

The last time the filters needed rebuilding, the Engineering Dept. decided to see if there were other, more stable types of underdrains. After investigating all systems, ALOXITE aluminum oxide porous plates were singled out as probably the best. One reason was that they seemed less difficult and less expensive to adapt to the old filter construction.

Letters were then sent to operators using these plates, inquiring as to their success in service. Many favorable replies were received, one all the way from Nyköping, Sweden—and, as a result, all four filters were modernized with ALOXITE porous-plate bottoms.

To quote from Lewiston's 1951 City Engineer's Annual Report: "(The new filters) have given the utmost satisfaction. They wash evenly and the initial loss of head is less than it was with the original construction."

*Our congratulations to Lewiston on a thorough job of investigation, and a careful job of installation. We know the City will continue to be pleased with the low operating and maintenance costs of these porous-plate underdrains.*

**THE FULL LEWISTON STORY** is described in a magazine article by W. H. Berkeley reprinted from the AWWA Journal. It tells of their experiences with graded gravel, pipe lateral bottoms, describes how they installed the porous plates, and outlines the benefits derived from the new underdrains. A copy of this article, together with a 56-page booklet on porous media, will be sent free of charge. Simply address: Dept. W-73, Refractories Div., The Carborundum Company, Perth Amboy, N. J. Both are very worth-while.

# CARBORUNDUM

Registered Trade Mark

Thousands use our Readers' Service card to keep up to date . . . do you?

The burning of sized foundry coke impregnated with a solution of silver iodide in acetone in a furnace at optimum temperature of 2500°F is recommended by the author. All fuels are laboratory tested before being sent to the field. In the field they are burned in a rugged piece of equipment which feeds and burns approximately 1 lb. of fuel per hour.

Successful seeding operations are entirely dependent upon correct and continuous meteorological data over wide areas having a bearing upon target areas under control.

These data are available through the U. S. Weather Bureau teletype circuits.

Headquarters and nerve centers of this rainmaking program is in Denver, Colorado with regional offices in Oregon, South Dakota and Texas. Satellite bases are located in Utah and Arizona and fixed as well as portable generators are located at strategic points to target most any storm on a desired area.

Considerable pre-operational studies are needed. In areas with moderate rainfall weather modification can be provided at a cost as

low as one-half of one percent of increased productivity.

Ohio each year has about 2½ as many good and fair cloud seeding opportunities as does New Mexico. The greater number of seeding opportunities together with more complete agricultural development places Ohio in a position to receive greater benefits than would be possible in New Mexico. Cost of a satisfactory program is usually one cent per acre per year for 100 percent participation in a given area. Probably the most satisfactory method of financing is to organize weather modification districts similar to soil conservation districts and assess costs.

The development of objective methods of appraising benefits derived from cloud seeding operations has progressed rapidly since 1950. In Washington, two cloud seeding operations in one month increased rainfall from a normal of ½ inch to something over 2 inches and probably increased wheat yield by 10 bushels per acre at a benefits-to-costs ratio of 100 to 1.

Future research and development, making it possible to operate at higher temperature on clouds, will be helpful. Weather modification may become a push button affair within the next decade. Its benefits are limitless in developing many areas of the world.

• • •

#### Los Angeles Study Reveals Freeway Benefits

LOYD ALDRICH, City Engineer of Los Angeles recently submitted a special report to the Board of Public Works outlining the estimated savings to the motorists when using freeways in lieu of surface streets. Because of the widespread need for factual information on the economics of freeways, the following excerpts are presented from this report.

"It is conservatively estimated that the minimum freeway benefits to the average motorist in congested traffic areas is 2¢ per vehicle mile. This includes the following types of savings: gasoline 0.33¢, maintenance costs due to elimination of stop and go travel 0.24¢, accidents 0.56¢, time (commercial vehicles only) 0.87¢. Detailed information is included in the appendix of the report to substantiate the savings indicated.

"Applying the above listed benefits to the record of vehicle mileage on presently completed sections of freeways (in the Los Angeles area),

## Give Your METER READER

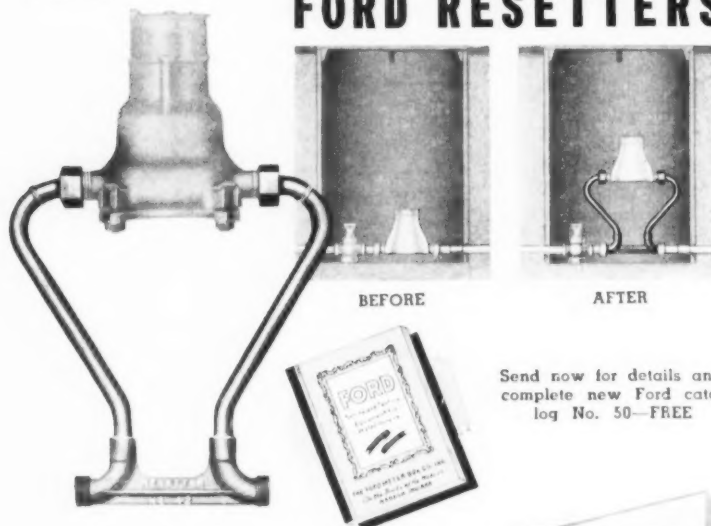


## a Break!

Save hours of meter reading time and get more dependable readings by bringing your meters UP with Ford Resetters.

These handy, easy to install, settings are made to raise meters from 6" to 30" or more above the old position. Meters are then cleaner and far more accessible.

## FORD RESETTERS



BEFORE

AFTER

Send now for details and complete new Ford catalog No. 50—FREE

THE FORD METER BOX COMPANY, INC.

FOR BETTER WATER SERVICES

**FORD**

Wabash, Indiana

Need more facts about advertised products? Mail your Readers' Service card now.

we find that on the very conservative basis used herein, in the last three year period 776,100,000 vehicle miles of travel at 2¢ per mile savings resulted in savings of \$15,522,000. The original cost of the 16.57 miles of freeways under study was \$42,026,683. If the savings at the above rate could be applied to payment for the freeways, their original cost would be amortized in less than ten years. Factual economic analysis shows that due to the much higher benefits and volumes, the higher cost freeway will show a much greater return per dollar invested than outlying freeways which cost less but carry much lower volumes, with lower unit benefits to the motorist.

"In addition to the basic figure of 2¢ per mile of freeway operation savings, there are, of course, many other direct and indirect benefits to the motorists and general citizenry which cannot be easily evaluated in monetary terms, though none the less real. Among these are, stabilization or enhancement of property values, relief of existing overburdened surface arteries, doubling of the practical radius of real estate development on a travel time basis, increased access to recreational or cultural facilities, increased mobility in times of disaster emergencies, increased tourist travel, reduction of strain of driving and all of the other well known advantages in betterment of transportation. The benefits to the large amounts of traffic continuing to use formerly heavily congested surface arteries after the freeway system is built are not usually visualized. Before and after surveys have shown that removal of through traffic from surface arteries to the freeways benefits community business, property values, surface travel time, and safety on the surface system. In addition, the intended use of the freeways by express buses will greatly increase the economic value of the freeways to the general public, of which the motorist comprises a large part. The monetary value of these benefits could very well amount to huge sums, since they are all so vitally integrated with the general financial health and progress of the region. It should be borne in mind that conversely to the benefits accruing from having good transportation, if there were no freeways there would be the losses that the region would suffer without having them. Furthermore, the region has rapidly developed and is continuing to do so through the use, in the main, of the motor vehicle."

## Per Capita Use of Water in Public Schools

KAROL S. WISNIESKI AND MAX GARBER,

District Sanitary Officers, Massachusetts Dept. of Public Health

**S**CANT information has been available to engineers, architects and community officials about the quantity of water used in public schools. Knowledge of per capita water consumption is helpful as a basis for design of unit water supplies and sewage disposal systems. Unnecessary overestimates and unwise underestimates impose a cost

to the community that can be avoided.

In communities where water is metered to schools, five annual water consumption readings during the period of 1946 to 1952 were obtained from local water department records. Corresponding school populations were obtained from local school department records. A five-



**No other hydrant is so  
inexpensive to maintain—  
so quick and easy to repair**

- The Mathews Hydrant is so simply and soundly constructed that there's virtually nothing to go wrong.
- Only one point needs lubrication—the operating thread—and that only during routine inspections.
- A Mathews Hydrant broken in a traffic accident can be quickly repaired without excavating and nozzle levels can be adjusted with the same ease.
- For community fire protection, rely on Mathews Hydrants, the standard of the industry.

## MATHEWS HYDRANTS

Made by R. D. Wood Company

Public Ledger Building, Independence Square, Philadelphia 5, Pa.

Manufacturers of "Sand-Spun" Pipe (centrifugally cast in sand molds) and R. D. Wood Gate Valves

**150<sup>th</sup>**  
anniversary

### NO OTHER HYDRANT OFFERS SO MANY ESSENTIAL FEATURES

Compression type valve prevents flooding • Head turns 360° • Replaceable head • Nozzle sections easily changed • Protection case of "Sand-Spun" cast iron for strength, toughness, elasticity • All operating parts contained in removable barrel • A modern barrel makes an old Mathews good as new • Available with mechanical-joint pipe connections

Get full details of this month's new products... mail your Readers' Service card today.

year average expressed in gallons per capita per day was derived for each school from each set of readings. To compensate for the days of the year when school buildings are not in use, 160 school days were used for the grade school year, and 180 school days were used for the junior high and high school years.

The following is a summary of the ranges in per capita water use of the groups of schools surveyed:

(1) 31 grade schools without cafeterias and showers varied from 2.36 gallons per capita per day to 14.6 gallons per capita per day.

(2) 10 grade schools with cafeterias varied from 2.62 gallons per capita per day to 11.07 gallons per capita per day.

(3) 16 junior high schools with and without cafeterias and showers varied from 2.27 gallons per capita per day to 8.92 gallons per capita per day.

(4) 30 high schools with cafeterias and showers varied from 2.63 gallons per capita per day to 20.92 gallons per capita per day.

In order to resolve these variations into useful information, graphs were made on normal probability

paper. The mean water use, the 90 percent probability and the 97.9 percent probability, all in gallons per pupil per day, are shown in Table 1 for the groups listed in the preceding paragraph.

**TABLE 1—SCHOOL WATER USE**

Group Number	Mean Use	90% Probability	97.9% Probability
Gallons per pupil per day			
1	6.0	10.25	12.75
2	6.25	10.50	13.00
3	5.5	9.75	12.25
4	9.0	15.5	19.25

These summaries of water use will assist the planner in deciding upon the quantity of water needed, or the quantity which must be disposed of at schools. Certain cautions should be observed, however. If a school is to be used as a community center for numerous evening meetings, special courses, and athletic activities, the quantities must be increased accordingly. Several schools in this category reported water use from 20 to 40 gallons per capita per day. The occasional use of the school building for PTA meetings, Boy Scout meetings, and dances will not increase the per capita water use significantly.

Several explanations account for the variation in per capita water consumption among schools. In some communities there is a tendency to conserve water due to occasional shortages, difficulties with sewage disposal works, or charges to the school department for water. In communities where there are no brakes to excessive water use, plumbing repairs or replacements are delayed, (several reports indicate quadrupled water used during a whole year or more before a leak was detected or repaired), continuous flushing of urinals is allowed, and drinking fountains are allowed to run continually. The limits in accuracy of water meters may also account for some of the variations. Since schools are not charged for water in most cases, water meter maintenance is delayed longer than for "paying customers". Schools with children from areas not provided with public water supplies use less water. The neighborhood school in the city may use less water because most of the children are within a few minutes of home.

This article is from *Sanitalk*, publication of the Massachusetts Department of Public Health.



**Another  
FIRST  
FOR  
SMITH-BLAIR...**

**NOW!  
SMITH-BLAIR  
Ductile Iron  
TAPER SEAL  
SERVICE CLAMPS!**

For the first time, the amazing new material, ductile iron, is available in the complete line of Smith-Blair "Taper Seal" Service Clamps!

Ductile iron service clamps offer the important advantages of bronze—at less cost. They are stronger, more ductile—and have a corrosion resistance that is superior to malleable or cast iron.

Combined with the many advantages of the exclusive "Taper Seal" design—which makes possible a quick, easy installation with a more positive water seal—the Smith-Blair Ductile Iron Service Clamps set a new standard for the industry!

• Write today for complete information:



**MAIN OFFICE and FACTORY**  
533 RAILROAD AVE., SOUTH SAN FRANCISCO  
BRANCH PLANTS: DOWNEY, CALIFORNIA  
GREENSBURG, PENNSYLVANIA  
DISTRIBUTORS IN PRINCIPAL CITIES

**Another  
FORWARD  
STEP  
For the  
WATERWORKS  
INDUSTRY**



# MULCHING ON ROADSIDES FOR EROSION CONTROL

**M**ULCH has an important part in modern roadside erosion control. It reduces soil movement and protects and encourages the establishment of grass and other ground cover. During the past decade there has been a marked improvement in adapting proven basic principles of mulching to roadside conditions and in developing new mulching techniques, notably mechanizing mulch application and simplifying methods of holding mulch in place. Mulching, as dealt with here, means an application of a surface cover of straw, hay, or other material, with only such incorporation into the soil as may be needed to hold the mulch in place.

*Reasons for Mulching*—Principal benefits of mulch on roadside areas are that (1) by intercepting raindrops, it reduces their force, and increases absorption of water; (2) it conserves soil moisture by reducing evaporation; (3) it reduces movement of soil, seed, and young seedlings by water, wind, or frost heaving; (4) it gives protection to young seedlings against sun, drying winds, and wide fluctuations in soil temperature; and (5) it slowly but eventually adds organic matter to the usually low-organic-content soils of roadsides.

In some cases, mulching without seeding is done out of season not only as an immediate erosion deterrent but also as a means of improving the physical condition of a soil area, such as a steep slope, that is hard to reach with machinery for seed-bed preparation. The absorption of moisture and the mellowing of the soil by mild freezing and thawing provides seedbed which, though not ideal, is satisfactory for seed which is sown through the mulch at the proper season.

Mulching is not without disadvantages. In some states no mulching is done because of the danger of serious fires, particularly in forested areas. Partial incorporation of mulch into the soil lessens this danger. In general, however, and considering the country as a whole, the benefits of mulching on roadsides far outweigh the disadvantages.

*Types of Mulch Material*—The

most widely used roadside mulch materials are grain straw, hay, and roadside mowings. Straw and hay can be bought in quantity in bales which are easy to store, transport, and handle. On the other hand, if roadside mowings are available in sufficient quantity and do not have an objectionable weed content, their use can reduce cash expenditure for mulch. Even when roadside cuttings are baled for easier handling, material costs are appreciably reduced.

In some states a quick cover crop is allowed to grow to maturity, then cut and used as mulch at the time permanent seeding is done. This growing of mulch "in place", so to speak, does not always provide all the mulch needed, but it can make sizable reductions in costs after having already served for temporary erosion control. An important material is "seed mulch". This is mature unthreshed grain or grasses which, when applied as mulch to the roadside area, disseminates seed that germinates and provides a desirable cover.

Inorganic materials are also useful as mulch. Asphalt has been successfully used in some regions under suitable soil conditions. After proper soil preparation, seeding, and rolling, a thin film of asphalt material is sprayed over the seeded area to hold the soil in place until the seed germinates. The seedlings break through the thin asphalt coating or through the checks which develop in the asphalt. Not "just any" asphalt can be used; a specially refined cutback asphalt has been patented and manufactured, and asphalt emulsions have also been used for this type of mulching.

*Rate of Application*—Up to the present time, organic mulches have been by far the most widely used. Mulch has been variously specified on the basis of tons per acre, inches of thickness or so many straws thick. Specifications have varied from 2 to 5 tons per acre, 1 to 6 inches in depth, and 3 to 6 straws in thickness.

*Methods of Mulch Application*—As the value of mulching in roadside erosion control became recognized, it was apparent that the

slowness and cost of the operation limited its widespread use. In recent years this limitation has been overcome by mechanization. Since a large part of the cost was in placing mulch by hand, a relatively new machine—the mulch blower—is slashing applications costs. Operating in a manner similar to a silo filler or the straw blower of a threshing machine, it blows mulch onto high steep slopes as well as on flatter areas.

*Holding Mulch in Place*—The problem of holding mulch in place against wind, gravity, heavy rain, and whipping by traffic movement has been a serious one. Among the hand methods employed to hold mulch in place are: (1) stakes driven into slopes, sometimes with brush or poles attached; (2) a network of binder twine or light wire held in place by stakes or spikes; (3) soil spread lightly over the mulch; (4) mulch partially punched into the soil with shovels or spades; and (5) chicken or hog-wire fencing laid over mulch and anchored with stakes. For extensive roadside areas in general machinery has replaced hand fastening of mulch. On shoulders and the flatter slopes, a farm-type disc harrow (with discs set straight), or a mulching tiller working on the same principle, can incorporate enough of the mulch into the soil to hold it in place. A rotary-type pulverizer or mixer can incorporate mulch into the soil to any degree desired. A sheepfoot roller combines compaction with mulch anchoring and can be used on steeper slopes than discs by operating it from the top of the slopes by cable and winch.

On the steeper roadside slopes, mulch is being successfully held in place by spraying it with asphalt. (This method is not the same as the asphalt mulch previously described.) Material such as straw, hay, or roadside mowings is applied to the slope in the usual manner. Then only enough asphalt is sprayed on to hold the mulch particles together in a loose mat, giving a speckled appearance and by no means completely coating the mulch particles with asphalt. An RC-2 asphalt is most widely used for this purpose, at rates of 0.05 to 0.15 gal. per sq. yd., according to the steepness of slope, wind conditions, and thickness of mulch.

This material has been abstracted from Roadside Memorandum 6 of the Highway Research Board.

# PUBLIC WORKS

# DIGESTS

## THE HIGHWAY AND AIRPORT DIGEST

### Salt-Stabilized Surface for Streets

Hancock County, Ill., last year experimented with treating crushed-stone roads to prevent loss of material from raveling and dust. The old surface was scarified 3" deep and rock salt spread on it at the rate of 3½ tons per mile. The surface was then moistened with water and a Seaman Pulvi-mixer used to obtain a uniform mix and surface. It was watered again and compacted with a 5-ton pneumatic roller, followed by a tandem steel wheel roller. It was opened to traffic for two or three weeks and then treated with calcium chloride at the rate of ½ lb. per sq. yd., applied as a solution. The resulting surface was very hard, dense and tight with practically no raveling.

"Salt Makes Unimproved Streets Stand Up;" by J. R. Fay, Supt. of H'ways. *American City*, June.

### Patching Pavements

This article is a comprehensive text describing the various causes of failure which necessitate patching of the different types of surfaces; the tools and equipment used for patching; the materials used for patches; and the procedures for making the patch. Finally the author describes what can be done to prevent or reduce the necessity for patching. The article extends over 15 pages of the magazine.

The most usual cause of failure is insufficient or unstable support, with poor drainage and entrapped water as frequent contributing factors; although failure sometimes may be due to some defect of the pavement itself. Prevention can sometimes be effected by improving inadequate drainage. Prompt, continuous and effective maintenance will generally reduce or postpone

the necessity for patching. This includes surface treatment of bituminous pavements; pumping material under concrete pavements where "pumping" action begins; patching spalled areas in concrete pavements while they are still small; placing a new bituminous top on an old concrete pavement; and keeping cracks and joints filled to prevent entrance of dirt or water.

Methods of patching untreated surfaces, surface-treated roads, bituminous macadam and concrete, cement concrete, and brick and block pavements are described in detail; including shallow breaks, pot holes, and service cuts and trenches. The materials used for patching include the various grades of bituminous materials, bituminous concrete, cement concrete, and soil cement.

The equipment used for patching includes hand tools, heaters, air compressors, pavement breakers, concrete drills and saws, tampers, rollers, sweepers, blowers, bituminous distributors, cover spreaders, concrete mixers, bituminous mixers, dryers, heating kettles, pouring pots. All of the materials, equipment and methods are described in great practical detail.

"Patching Pavements Properly;" by George E. Martin, Highway Consultant. *PUBLIC WORKS*, June.

### Stockpiling Winter Salt Supply in Summer

Springfield, Mass., uses some 3,000 tons of salt on its streets in a winter. Having in the past experienced delays in obtaining deliveries of salt in the winter, it now arranges with a New England distributor of rock salt to stockpile 75% of an estimated winter's supply in the summer. This is placed near a railroad siding and covered with a large plastic sheet 35 ft. wide by 200 ft. long. The delivery in 1951

was completed in July and the last of it was used the next April. The cover had to be replaced during the winter. The Rayn Shed Co. provided last year a cover that lasted throughout the winter, and the city considers the experiment a success.

"Winter Salt Supply by Summer Stockpiling;" by James J. Sullivan, Supt. of Streets, *American City*, June.

### Delaware Darkens Concrete Pavement

The Delaware State Highway Dept. in repaving Maryland Ave., between Wilmington and Newport, with concrete, darkened it by adding two pounds of carbon black per sack of cement used in concrete near the

### Municipal Garage Houses Public Works Equipment

THE City of East Detroit, Michigan, has just completed a new municipal garage to house and maintain all of its public works equipment. The 75-ft. by 152-ft. building was financed from surplus in the General Fund of June 30, 1952, and was constructed at a cost of \$75,000. Cooper Construction Co. of Detroit was the contractor and the architect was Carlton P. Campbell of Wyandotte, Mich. This information and the picture were sent to us by Charles H. Beaubien, Acting City Manager of East Detroit.



New Municipal garage

# You pick the job!



**W**HAT's the toughest blading operation you've got? Ditching? Bank-sloping? If you want to see it done better, easier, with more work output per hour, watch a Cat\* Motor Grader handle it.

Watch the operator change through the full range of blade positions in one minute without leaving his seat! Get into the seat yourself! Notice how the operator has a full view of his work without standing up. Check the steady production with no stops for adjustment.

Your Caterpillar Dealer is ready to demonstrate

any of the three models—No. 212, No. 112, or No. 12. Fair enough? Call him today.

Caterpillar Tractor Co., Peoria, Illinois.

## **CATERPILLAR\***

\*Ditch Cat and Caterpillar are registered trademarks—®

**NAME THE DATE...  
YOUR DEALER  
WILL DEMONSTRATE**

city, reduced to 1 pound in the rural area. Curbs, sidewalks and cross walks were made with uncolored cement. The object was to diminish glare and heat reflection, provide a color contrast at curb lines, and have the appearance conform to that of city streets without the expense of covering it with asphalt. The use of the carbon black added from 35 to 65 cts per sq. yd. to the cost.

"Delaware Darkens Concrete Pavement to Reduce Total Paving Outlay," *Engineering News-Record*, June 4.

### Leo Ritter

(Continued from page 14)

important; intersections at which the cross traffic is between 10 and 20 per cent of the total have accident rates more than twice those at intersections where cross traffic is less than 10 per cent of the total. In the same issue of *Public Roads* there is another report on braking distances for vehicles traveling at a range of speeds under a variety of conditions. The report shows that

there is very little difference in frictional resistance of commonly used high-type surfaces when dry, but quite a range when the surfaces were wet.

**From the Air** — We have recently, again, had several opportunities to view a portion of the nation's highway system from the air. To one who is interested in highways, it is always an impressive sight. We were particularly impressed recently by the broad ribbon of the New Jersey Turnpike as it cuts its graceful and purposeful way across that teeming state; and by the New York City Parkway system, notably the West Side (Henry Hudson) Highway, at night. Sometimes I feel that those of us in the highway business, and certainly the citizenry as a whole, do not pause and reflect often enough about the magnificent highway and street system which we now have—the finest in the world. Sure, we have plenty of problems, but along with them there is no lack of solid accomplishment in highway transportation. Your writer has had the privilege of driving on streets and highways in 41 of the 48 states; and has built up a deep sense of pride in the accomplishments of highway engineers and administrators as a result.

**Prestressed Concrete** — Why prestressed concrete? Obviously, the answer to that question is a long story, but the general idea is this: Concrete structures, including bridges and roads, must be designed to allow for the fact that concrete is weak in tension. However, concrete is strong in compression. Hence, in prestressing a compressive force is applied to the member before the loads which it is designed to carry are applied. If the member is properly designed, then the design loads do not cause tensile stresses which are large enough to offset the compressive stresses introduced by prestressing. In other words, the concrete is never subjected to tension.

Prestressed concrete is being used in an increasing number of cases in this country in structures, including bridges. However, so far as the writer knows, there has been no construction of prestressed concrete roads in the United States. There have been some built in Europe and experience there points up some interesting facts which may eventually lead to this type of road construction here, particularly for airport runways designed to support very heavy aircraft.

# STOP WEEDS

...for lower maintenance costs!



this powerful weed killer can  
keep ground bare of weeds and grasses

Highway Commissions and large scale industrial users prefer BORASCU Weed Killer because they know they can depend on the results... it's quick and easy to apply; provides long-lasting control at low cost. BORASCU is not only useful for the destruction of weeds and grasses but also for the pre-treatment of asphalt or gravel covered areas to protect against the possibility of weeds breaking through the paved surface and destroying it. Countless parking areas, airport landing fields, and storage areas have been given the protection of BORASCU... it's good insurance for any paving job!

#### SO EASY TO APPLY

Just a man...

a pail...

and BORASCU

**NONTOXIC • NONFLAMMABLE • NONCORROSIVE to ferrous metals**

Service Bulletins,  
and Quotations  
Sent on Request



Get full details of this month's new products... mail your Readers' Service card today.



Among the principal advantages accompanying the use of prestressed concrete in pavements are a saving of material, in that much thinner sections of concrete can be used without loss of strength; the length of slabs between joints can be much greater; there may be less steel used than in normal reinforced slabs; and cracking would be eliminated, thus doing away with pumping and associated difficulties. These advantages were emphasized by Colonel W. P. Andrews of England when he discussed this subject before the annual meeting of the American Road Builders' Association a few months ago. The elimination of joints has an obvious advantage in runways for jet aircraft, because jet blasts are very damaging to the normal materials used in joints. One of the big disadvantages of this type of construction is the lack of knowledge about the design of prestressed road slabs. Another notion in this country has been that increased labor costs would more than offset any saving in materials. These factors have contributed to the slowness with which prestressed construction has been adopted here.

**From Here and There**—The Turner Turnpike between Tulsa and Oklahoma City (88 miles) has been officially opened to traffic. It's the first toll road between the Appalachians and the Rockies. The Connecticut Highway Department has installed 18 new traffic lights on the Berlin Turnpike from Wethersfield to Meriden (12 miles) to control traffic movement and hold speeds to 45 miles per hour. Latest word from the horse's mouth is that the chemical methods of soil stabilization under investigation by the Corps of Engineers have not yet reached a practical stage.

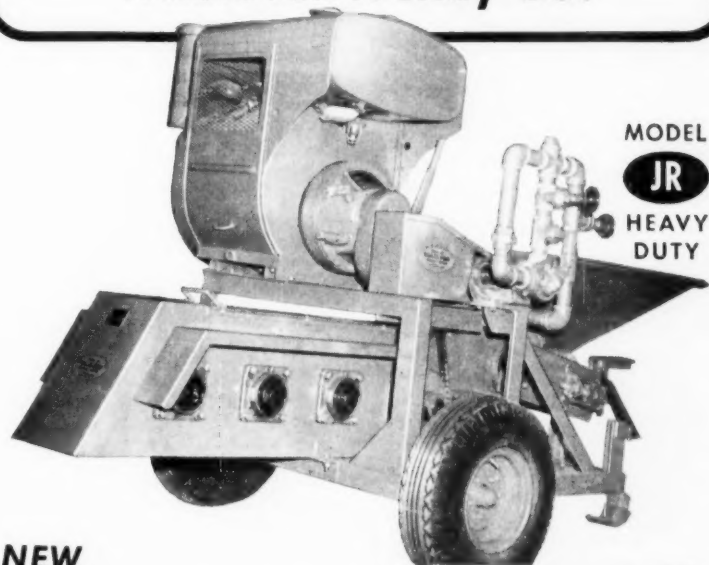
• • •

#### Utilization of Toronto's Refuse

**T**ORONTO, Canada, is completely surrounded by 12 municipalities which are developing rapidly. This complicates its problem of disposing of refuse. To dump beyond these municipalities would necessitate a 40-mile round-trip haul. In 1950 the City Council retained the Ontario Research Foundation to make a scientific study of the problem, which was conducted during 1951 and 1952 and will be continued during 1953.

The report of the Foundation for 1952 states that incineration now provides for disposing of 200,000

## Now You Can Do ALL Asphalt Mixing On Location— Wherever It May Be!

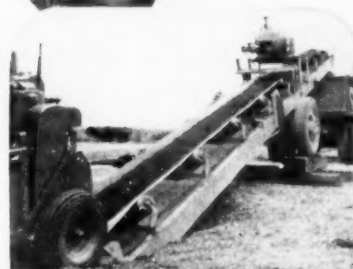


MODEL  
**JR**  
HEAVY  
DUTY

### NEW *McConnaughay* MULTI-PUG PORTABLE ASPHALT MIXER

A great new time- and labor-saver that enables you to cut trucking costs and boost profits on asphalt paving jobs. Easily portable to any location and set up at the nearest pit or at on-the-job stock piles. May even be coupled to aggregate trucks for mixing and depositing on the move.

Sturdily built for long life and trouble-free service, this Model JR McConnaughay Portable Mixer is powered with a Wisconsin VP4 gasoline engine. Asphalt is supplied and proportioned by a Viking positive displacement pump. Aggregate is proportioned by a feed-belt conveyor which delivers one ton per minute. Other sizes may be custom-built to meet any requirement . . . with capacities as large as six tons per minute. Now being used with great success throughout America; also in Europe, Panama and Alaska. Write today for details and specifications.



Effective at Aggregate  
Source—Or On The Job



**K. E. MCCONNAUGHAY**  
LAFAYETTE 4, INDIANA

tons of garbage and combustible waste, but 300,000 tons of combustible materials and 112,000 cu. yd. of street cleanings must be disposed of otherwise. The general proposal is to convert leaves to leaf mold soil conditioner (during 1952, 1,000 tons of this were sold); to treat the household garbage to produce a humus for soil conditioning and other commercial products; and recover metals from the incinerator ash.

The household garbage comprises 25% table refuse, 49% paper, 7.3% cans and metals, and 6% bottles. The practicability of producing humus from the table refuse is being studied; it is calculated that the humus would amount to about 16%, by weight, of the table refuse. The paper totals about 50,000 tons a year. This can be used for making a low-grade paper; or it can, by proper chemical treatment, be partially turned into a sugar which can be used as the raw materials for fermentation industries producing solvents and plastic precursors. By screening ashes from the three incinerators, 6,100 tons of tin cans and metals were recovered in 1952.

In 1952 the city obtained a revenue of \$8,500 from sale of 1,002 tons

of paper; \$27,456 from 6,100 tons of tin cans and metals; and \$6,987 from 1,000 tons of leaf mold soil conditioner, of which there is on hand an amount with an estimated value of \$76,000.

• • •

### Hot Plant Mix

(Continued from page 56)

Our 1953 season is well under way; in fact, it began in January when we mixed a quantity of SC-3 stockpile patch material. Our regular paving work began in April. This year we will place approximately 30 miles of hot mix resurfacing over existing blacktop roads. Another 20 miles will be required to improve broken areas on existing roads. Our winters are most severe and frost damage is commonplace. Our first job each year is to do our patch work; then we resurface directly over these patches when the repair work required is sufficient to justify it.

We have also scheduled about 10 to 12 miles of street resurfacing for towns in our county. We bill them for this at cost of material plus cost of work performed. Incidentally, our towns are getting very black-top-

minded. One village recently proposed that we pave for them a 40-ft. stretch in front of each house as a dust abatement measure; when the impracticability of such a checkerboard arrangement was pointed out they finally withdrew the request. But other towns are making increasing demands on our production as a result of increased tax structures plus funds made available to them from the state and federal governments. These jobs, plus our 75 miles of seal coat work will give us a busy season.

Giving our county more roads, better roads and cheaper roads is a tough but satisfying job.


• • •

### Savannah Public Works

(Continued from page 53)

of absolutely necessary facilities, mostly for water and sewer works, the amount of appropriated funds has not permitted the allocation of any money for community services.

Under Title III, the U. S. Public Health Service (Federal Security Agency) administers aid for water purification, sewage treatment plants (including interceptor sewers) and



**FASTER PIPE LAYING...  
NO TRAFFIC INTERFERENCE**

# HYDRAUGER\*

REG. U. S. PAT. OFF.

**OPEN HOLE**

**HYDRAUGER CORP. Ltd.**  
681 Market Street  
San Francisco, California

\*Earth Boring Tool

**Get Booklet**  
... shows the incredible savings Hydrauger makes in both time and cost.

<b>BORES</b>	2" through 24"
<b>DISTANCE</b>	up to 225 feet or more, per setting, depending on earth formation being bored.

## WHAT IS YOUR NEED? DITCHER or DIGGER



"SCOUT" DITCHER

Designed for heavy and extensive digging. Works throughout 150° arc. High pressure hydraulic system enables all cylinders to operate simultaneously. Digs almost 11 feet deep, loads up to 8 feet 6 inches, reaches 14 feet.



SHAWNEE HYDRO-CLAM

The answer to heavy digging—digs straight down because hydraulic (4½ tons) pressure is applied to both halves of clam. Even bites through hard, frozen earth and tough black top. Loads up to 7½ feet.

Easily installed on Ford, Ford-Ferguson and Ferguson tractors.

For Complete Information, Write:



**SHAWNEE  
MANUFACTURING CO., INC.**

1947- L North Topeka

Topeka, Kansas

It's a fact... our handy Readers' Service card is the way to get new catalogs

refuse disposal facilities and services. The HHFA administers other forms of assistance for which funds are now available.

Through cooperative agreement between the Public Health Service and HHFA, the same application form, and the same instructions for submitting information, are used by the two agencies. The HHFA also made its field offices available to PHS representatives, thus enabling local officials concerned with community facilities to transact their business with the Federal government at one place.

Funds to operate P.L. 139 were appropriated November 1, 1951, and the HHFA and the PHS approved the first application under Title III on April 16, 1952. By January, 1953, they had acted affirmatively on applications from eight communities. The approved programs, largely for water and sewer programs, and the amounts of Federal assistance, comprising \$5,545,161 in grants and \$300,000 in loans, were:

North Augusta, S.C., \$738,600 for water and sewer purposes; Blackville, S.C., \$270,000 for water and sewer; Allendale, S.C., \$255,000 for sewer purposes; Williston, S.C., \$819,500 for water and sewer; Barnwell, S.C., \$545,000 for water and sewer; Aiken, S.C., \$1,290,00 for water and sewer; Augusta, Ga., \$1,613,061 for water and sewer; and Jackson, S.C., \$235,000 for water.

Also, under the Hill-Burton Act, the Public Health Service had authority to assist communities to provide for their hospital needs. Although designed to meet normal civilian needs rather than the requirements occasioned by the influx of newcomers to build and service the new atomic energy installation, the four hospitals aided under the Hill-Burton Act will aid materially in carrying the heavier load now thrown upon the hospital facilities in the area. The location of these facilities, and the Federal contributions toward them, are: Augusta, Ga., \$975,600 to add 110 beds to the St. Joseph's hospital, and \$480,150 to expand the central hospital facilities of the University of Georgia; Richmond County Health Center, \$191,979; in Bamberg, S.C., \$334,170 to provide a 32-bed hospital; in Aiken, S.C., \$150,676 to provide a 50-bed hospital; and in Barnwell, S.C., \$30,427 for the Barnwell County Health Center.

In addition, the Bureau of Public Roads had authority to provide spe-

cial aid for the development of highway facilities in defense areas under the Federal Aid Highway Act of 1950 as amended. Under this authority the Bureau made available \$4.3 million for construction of four principal highways to service the Savannah River atomic energy installation. These roads are either completed or rapidly nearing completion. In addition to these principal highways, feeder roads which are part of the Federal aid primary and secondary systems are being improved by State or local authorities with the Federal Bureau of

Public Roads providing the customary assistance.

The four principal roads built entirely with Federal funds are: (1) a completely new four-lane divided highway from the atomic energy site toward Augusta, Ga., (2) the rebuilding of an existing two-lane highway as a four-lane highway toward Aiken, S.C., (3) replacement of an existing road with a new two-lane road around the northern boundary of the site; and (4) replacing an existing two-lane road toward Barnwell with a four-lane highway.



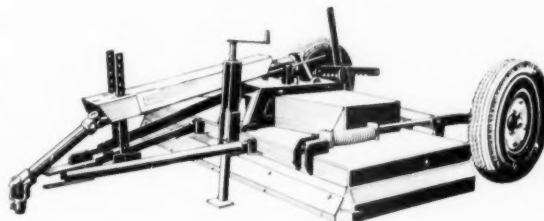
**LIKE ADDING  
AN EXTRA  
MAINTENANCE  
DEPARTMENT...**

*"all around the town"*



**For Rugged Brush  
or for Mowing Grass  
within 1"**

- Cutting and shredding weeds
- Mowing along roads and streets
- Cutting brush the size of a man's wrist
- Mowing airports in half the time
- Mowing around city buildings
- Mowing grass neatly down to 1"
- Mulching leaves—no raking or hauling
- Park maintenance



**7 models**  
— one to fit your  
needs perfectly,  
both hydraulic lift  
and pull types.

**WRITE**  
for literature describing  
mowers for all types of  
municipal maintenance.

**WOOD BROS. MFG. CO.**

Box 148B, Oregon, Illinois

PUBLIC  
WORKS

## DIGESTS

## THE SEWERAGE AND REFUSE DIGEST

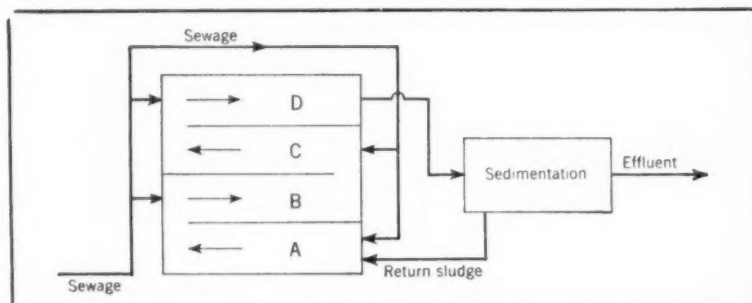
**Modifications of the  
Activated Sludge Process**

During the past 35 yr. a number of modifications of the conventional activated sludge process have been proposed, several have been patented, and a few are in use. The author describes reaeration of return sludge, the "bisorption process," step aeration, "Bioprecipitation," the Logan process, modified sewage aeration, the Zigerli process, activated slurry process, two-stage aeration, Gunson's returned sludge process, and the Kraus interchange process. The modification proposed most frequently is the aeration of return sludge solids before mixing with the sewage, which seems to offer savings in capital costs and perhaps in operating expenses. Step aeration makes for very flexible operation because it provides for nearly any degree of sludge reaeration and permits a wide range in sludge age or loading rates. Where a high degree of treatment is not required, high-rate processes offer savings in first cost and in operation. In general, several modifications of the activated sludge process seem to be more economical and to provide better efficiency than the conventional method.

"Modifications in Aeration and Activated Sludge Process Offer Flexibility," by Gail P. Edwards, Prof. of San. Chem., New York Univ, Civil Engineering, May.

**Radioactive Tracing  
Of Flow in Sewage Tank**

In tracing the flow of sewage through tanks, short circuiting, retention periods, etc., the use of either salt or dye has drawbacks. Recent experiments at Coventry, England, demonstrated the practicability of using a radioactive tracer for this purpose. Perhaps the most important consideration in selecting the isotope for this purpose is its



Courtesy Civil Engineering

In step aeration, sewage is added at two or more points, facilitating treatment.

half-life. Rubidium 86 has a half-life of 19.5 days; its radiations are very penetrating. The sewage flow at this plant was 12 mgd and the total radioactivity used per day did not exceed 1 millicurie, so the radioactivity of the plant effluent was insignificant. In the experiment, 5 ml. of rubidium 86 solution was added as quickly as possible to the filter effluent flowing to a humus tank and mixed thoroughly by means of two stirrers to produce a homogeneous band of labeled effluent. A small portion of the final effluent was pumped continuously through a Geiger-Mueller liquid flow tube connected to a ratemeter, which records the rate of pulse generation, which is proportional to the magnitude of the charge on the condenser. Any variation in the activity of the outlet of the tank was instantly shown on the meter. The results of this method checked well with those using salt or color, objections to which were density currents caused by the heavier salt liquid and change or elimination of color due to action of chemicals in the sewage; also by this method the long tails of the flow-through curves can be determined.

(See "Radioactive Isotopes Trace Underground Waters," in *PUBLIC WORKS* for January, 1952).

"Rubidium 86 Traces Sewage

Flow Through Settling Tanks," *Municipal Engineering*, England, May 15.

**Formulas for  
Analysis of BOD Data**

Theriault's monomolecular equation for analysis of BOD data gives only an approximate mathematical fit to small portions of an observed BOD curve. Biological oxidation is a complex biochemical phenomenon whose oxidation speed is governed by the relative proportions of the various types of material to be oxidized and the relative biological activity of the various types of organisms present. There is no fundamental biological reason why oxidation should take place according to a monomolecular oxidation reaction. The monomolecular equation is a poor expression for analysis of biological oxidation, because the two parameters of the equation,  $k$  and  $L$  are not constant, the value of  $k$  decreasing and the value of  $L$  increasing with increased time of BOD observation.

An equation known as the logarithmic BOD equation has more biological significance and is better adapted to the interpretation of biological oxidation phenomena than the monomolecular equation. The parameters of the logarithmic equa-



# These Two Methods End Sludge Disposal Problems

Effective as modern processes of sewage *treatment* are, they can lose much of their value if proper sludge disposal methods are not adopted.

The C-E Raymond System of Flash Drying and Incineration offers two completely modern methods of sewage sludge disposal — both performed by compact, reliable equipment.

**Flash Drying by the C-E Raymond System** is a continuous process in which vacuum filtered sludge — if uncontaminated with undesirable industrial wastes — is efficiently heat dried to a marketable fertilizer or soil conditioner retaining all its original nitrogen, but eliminating the objectionable qualities of the original wet sludge. In a well designed and operated "activated plant" the revenue from the sale of fertilizer is sufficient to cover the operating costs of both the drying and vacuum filtration.

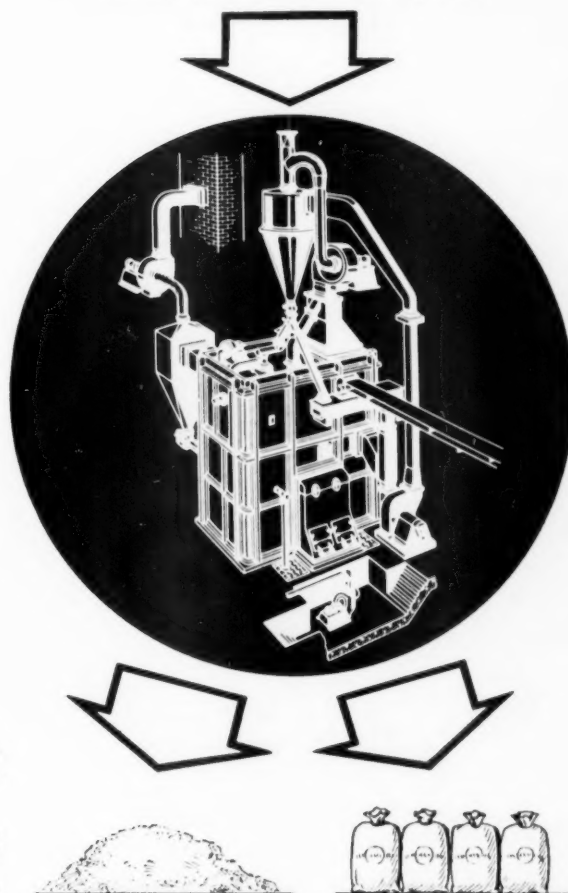
**Incineration by the C-E Raymond System** is an alternate, optional method. Where the production of fertilizer is not desired or the sludge is unsuitable, it is flash dried and then completely burned *in suspension* to an easily disposable, sterile ash.

The two methods can be combined in one system and used alternately as current market situations dictate. The entire design is completely flexible and can easily be tailored to suit the requirements of any community, large or small.

• The services of C-E specialists are available to help you plan for the end of atmospheric or stream pollution in your community, as it has been done in so many others. For specific recommendations on the most practical answer to your sludge disposal problems, get in touch with one of the Combustion offices listed at the right.

## SLUDGE

As a vacuum filter cake or thickened sludge from any type of sewage treatment process.



## ASH

As a fine dust, free from clinker and unburned organic materials.

## and/or FERTILIZER

As a dry powder, containing all the original fertilizer ingredients.

**Industrial Sludges, Too** are effectively and economically disposed of in C-E Raymond Flash Drying and Incineration Equipment. Write for details.

B634

## COMBUSTION ENGINEERING, INC.

### FLASH DRYER DIVISION

1315 North Branch Street  
Chicago 22, Illinois

Western Office: 510 W. Sixth, Los Angeles 14, Calif.  
Eastern Office: 200 Madison Ave., N. Y. 16, N. Y.



Get full details of this month's new products... mail your Readers' Service card today.

tion are easier to compute and are constants over a time range covering 85% of the total carbonaceous BOD. The semilogarithmic plotting of BOD data used to determine the logarithmic equation constants shows observed BOD data as a series of straight lines of different slopes, and each line may represent a special biological phenomenon.

"The Logarithmic Formula as Applied to Sewage," by Harold E. Orford, Rutgers Univ., and William T. Ingram, New York Univ. *Sewage and Industrial Wastes*, April.

### Stratford's Plan For Sewer Assessments

Stratford, Conn., formerly assessed sewer construction costs on a front foot basis. At that time most lots were rectangular, 50 x 100 ft. But today 75 x 100 is more common, and some lots are wide enough to permit future building of additional residences on them. The plan evolved for residences is to assess a lot, not by its size, but to place a unit assessment on each building that is or could be built on it. For industrial properties, the area is laid out as though it were a subdivision with 60 x 125 ft. lots on 60 ft. streets, and

each such lot that faces on the sewer is assessed for one residence. Lots on the first street beyond this are assessed 80%, on the next 60% etc.

"How Stratford Made Sewer Assessments Fair," by Allen B. Vermilya, Dir. of Finance, *American City*, May.

### Anaerobic Digestion Of Packing House Wastes

Anaerobic treatment of packing house wastes has been under investigation by Geo. A. Hormel & Co. for the past 3½ yr. About 2½ yr. ago a pilot plant was started on a process which basically consists of mixing in a digester the incoming raw waste with an activated anaerobic sludge at a temperature of 92° to 94° F., and then separating the sludge and returning it to the digester. It was concluded that packing house wastes seem to be peculiarly adapted to anaerobic digestion, because thermal and mineral requirements are intrinsically present. Packing house wastes of a wide range of concentration can be digested with a detention time of 24 hr. or less. BOD removals of 95 to 96% can be obtained. A practical

method of continuously removing entrained gas from the digester effluent by vacuum has been developed. The anaerobic effluent is amenable to further aerobic treatment, if necessary. This method lends itself to compactness of design and seems to offer economic advantages, in both construction and operating costs.

"Anaerobic Digestion of Packing Plant Wastes," by N. J. Fullen, Chemist, Geo. A. Hormel & Co. *Sewage and Industrial Wastes*, May.

### Spray Irrigation Of Food Processing Wastes

Spray irrigation of food processing wastes would solve the stream pollution problem for many food processors if adequate land is economically available. It is best adapted to areas where the terrain is generally rolling. In flat areas furrow irrigation may be preferred to spray irrigation because the initial outlay for extensive piping is not required; but it requires constant supervision. However, the costs of a spray irrigation system are often less than for lagoon construction with the added cost of odor control, and less than a standard waste

## Palmer Filter Equipment

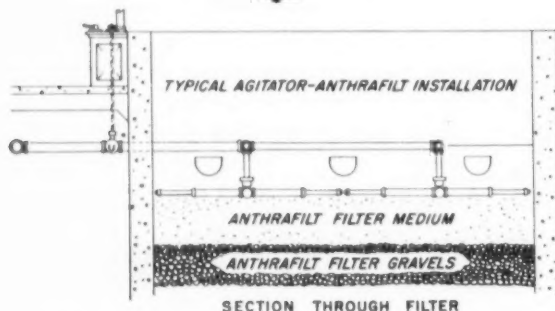
### Filter Bed Agitators

- 1—Requires average of 40% less wash water
- 2—Completely eliminates mud balls
- 3—Eliminates cracking or shrinking of beds
- 4—Produces "new" filter media after short period of normal operation
- 5—Turns out purer, better tasting water
- 6—Low installation cost
- 7—Low operating cost
- 8—More water through the filters
- 9—Less "time out" washing filters

### Anthrafilt Filter Media

*FAR SUPERIOR* to Sand or Quartz Media. Doubles length of Filter runs, nearly halves wash water needs; less coating, caking, or balling.

Filters in service more as wash water cycle shorter. Better removal of bacteria, taste, odor. Increased output, better effluent. For all types of Filters using filter media. Ideal for industrial acid and Alkaline solutions.



**PALMER FILTER EQUIPMENT CO.**

822 E. 8th St. • Erie, Pa.

## TRAFFIC ENGINEERS

Opportunities for Interesting and Challenging  
Work in the City of Detroit's Modern  
Traffic Engineering Department  
Two years of experience required

**DETROIT PAYS TOP WAGES**

Hurry your resume' to  
**Mr. R. Mueller, Detroit Civil Service**  
735 Randolph St., Detroit 26, Mich.

## Order Now . . . Water and Sewage CHEMISTRY and CHEMICALS

14 pages; illustrated;  
A Valuable Reference

In the operation of modern water and sewage treatment plants, some knowledge of chemistry and chemicals is essential. This practical text is now available in handy reprint form. All the information in this valuable handbook is presented in simple and not-too-technical terms so that anyone can understand it.

Order Now

A copy of this booklet will be mailed postpaid promptly on receipt of \$1. Money back if not fully satisfied.

write

Book Department  
Public Works Magazine  
310 East 45th Street  
New York 17, N. Y.

treatment method, even if the waste has to be pumped several miles to find adequate land. Waste from canneries and meat packing plants should be screened before being used for spray irrigation. Wastes from milk processing plants require only a minimum of screening.

"Spray Irrigation of Food Processing Wastes," by Joseph M. Dennis, San. Engr. Tennessee Dept. of Pub. Health. *Sewage and Industrial Wastes*, May.

### A 225-Acre Sanitary Landfill

Most of Ferry Point Park, in Bronx Borough, New York, will be on a sanitary landfill planned to cover 225 acres of marsh land. About half this fill has already been made and the Dept. of Sanitation is hauling in 2,000,000 cu. yd. of refuse yearly, which will compact into about 800,000 cu. yd. No residences will be placed on this landfill, New York City having learned its lesson when it put postwar emergency housing on landfill in Queens Borough.

"Construction Breeds Construction as Urban Development Gets Rolling"; *Engineering News-Record*, June 4.

### Removal of Radioactive Iodine

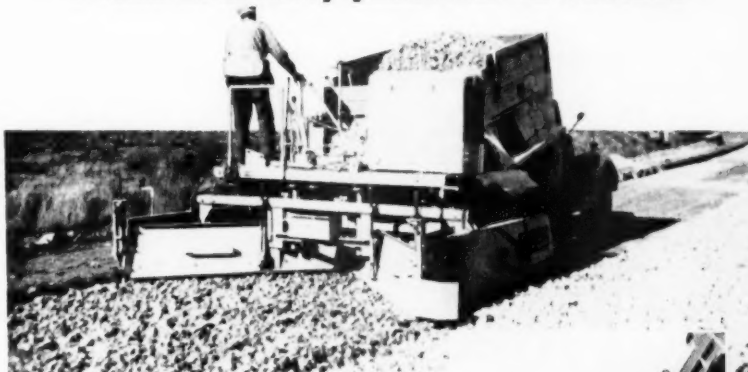
Growth of the atomic energy industry necessitates the discovery of a practicable method of disposal of its hazardous waste products. It has been learned that 90 to 95% of tracer quantities of  $Pu^{239}$  can be removed from aqueous waste solutions by activated sludge or trickling filter processes. The author described laboratory tests to learn whether  $I^{131}$  also could be removed by trickling filters. With a trickling filter dosed at 2 mgad with sewage "spiked" with a concentration of 1,000 counts per minute per ml of carrier-free  $I^{131}$ , approximately 85% removal was obtained; but such high removal might not be obtained in municipal practice.

"Removal of Radioactive Iodine by Laboratory Trickling Filters," by Melvin W. Carter, Sr. Asst. San. Engr., U.S.P.H.S. *Sewage and Industrial Wastes*, May.

### Designing Biofiltration Plants

Biofiltration has been used in more than 500 sewage treatment plants. The method can be so designed as to produce any required degree of treatment between sedi-

## Laying highway base without hand labor — 8 tons accurately placed in 45 seconds



### JAEGER Paver-Type AGGREGATE SPREADER

costing half the price of bituminous pavers, did all work of placing 12" base of  $3\frac{1}{2}$ " stone in 8" courses, loose lay. Averaged 45 seconds to unload trucks, spread 11' strip flush to berm, blend joint and strike off. Quickly adjustable for widths to 12 $\frac{1}{2}$ '. Larger size also available for biggest trucks.



Lays all aggregates, free-flowing bituminous mixtures or plant-mixed stabilized soil — highway and airport base, base and top of secondary roads, parking areas, drives.

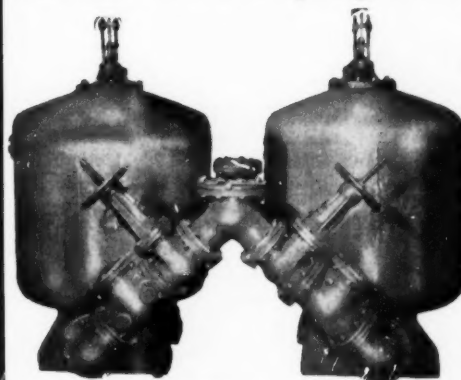
See your Jaeger distributor or send for Catalog SP5-1

### THE JAEGER MACHINE COMPANY

400 Dublin Avenue  
Columbus 16, Ohio

COMPRESSORS • PUMPS • MIXERS • TRUCK MIXERS • CONCRETE SPREADERS, FINISHERS

## EJECT SEWAGE... instead of Pumping it. Install Rugged



### BLACKBURN-SMITH PNEUMATIC SEWAGE EJECTORS

TO LIFT SEWAGE  
AND SLUDGE AT  
TREATMENT PLANTS

30 to 500 GPM in both single  
and twin units against high  
discharge heads.

Duplex Sewage Ejector, showing inlet piping.

Over 60 years service has proved the rugged worth of Blackburn-Smith Ejectors. Yet our today's product is full of exclusive modern features such as:

1. Float and electrical float switch controls.
2. Float and pneumatically controlled snap action valve.
3. Electrode controls.

Any one of the above, with or without Air Receivers.

Preferred by most prominent consulting engineers as less messy, more sanitary than centrifugal submerged type sewage ejectors or pumps. Ends screen and pump cleaning. Sewage can be lifted straight up 150 feet any capacity—once a minute, without fail. Catalog S-30.

REPRESENTATIVES WANTED. ADDRESS:

**BLACKBURN-SMITH MFG. CO. 93 River St. HOBOKEN, N. J.**

mentation and a well stabilized effluent. However low in BOD content, the effluent from any high-rate filter plant seldom contains any evidence of nitrification. Where nitrification is required, it can be obtained by using a high-rate filter as a roughing filter and passing its effluent through a low-rate filter. By using various combinations of one or two high-rate filters and two or three clarifiers, operated in various ways, the degree of treatment can be adapted to the sewage to be treated and the character of effluent desired. The author shows 6

flowsheets which have been used in actual plants, the conditions under which each was used, and the results obtained. These include single-stage, single-stage with dual recirculation, and two-stage with intermediate clarifier, which are the most widely used combinations. Another is used for high summer and low winter loadings. The other two have definite fields of application. Usually a specific quality of effluent is desired from a given strength of raw sewage, and these are used as a basis for selecting the most effective flow sheet. A factor having

considerable influence on filter performance is the recirculation ratio—the volume of flow recirculated divided by the average 24-hr. raw sewage flow. The author describes the various conditions for which each of the flow sheets is most suitable. One of the essential requirements for maintenance of uniform quality of final effluent in a high-rate filter plant is continuous withdrawal of humus sludge.

"Biofiltration"; by R. S. Rankin, of the Dorr Co. *PUBLIC WORKS*, June.

### Removing Phosphorus From Sewage Effluents

Undesirable algal growths in lakes and ponds are believed to be caused by high inorganic phosphorus and nitrogen concentration, a considerable part of which may be contributed by effluents from sewage plants when these are discharged into a confined body of water. Sewages from Minnesota communities contained an average of 2.3 g. of phosphorus per capita per day, of which treatment plants removed an average of 23%. Both laboratory and plant scale tests indicated that phosphorus can be almost completely removed by adding lime in controlled dosages. Slaked lime added to the influent of a final settling tank in quantity to produce 545 ppm of CaO reduced the phosphorus concentration from 7.4 ppm to 1.7 ppm.

"Removal of Phosphorus From Sewage Plant Effluent With Lime;" by Richard Owen, Assoc. P. H. Engr., Minnesota Dept. of Health. *Sewage and Industrial Wastes*, May.

### Effect of Intermediate Sedimentation on Double Filtration

Experiments were carried on in 1951-52 at Coventry, England, comparing the results obtained in operating two pairs of tanks by the alternating double filtration method, one pair operated with settlement of the primary effluent, the other pair without such intermediate settlement. The filters are circular, 12 ft. in diameter and 6 ft. deep. Settled sewage is distributed from 9 jets directed vertically downwards from a rotating arm which is mechanically propelled at a rate of one revolution in 2½ min. (Incidentally, it is interesting to learn that the period of retention in each tank was determined by using radioactive rubidium as a tracer). During Jan. 4 to



## His days are numbered!

Yes, it's time to say goodbye to Mr. Wet Chlorine Gas. Chlorinating equipment which has to cope with this character is subject to: (1) rapid deterioration of metallic parts, (2) frequent repair and replacement of expensive equipment, (3) faulty operation of partially corroded parts, and (4) troubles from chlorine hydrate.



Hundreds of modern plants have eliminated wet chlorine problems by installing BUILDERS Visible Flow CHLORINIZER . . . the chlorine gas feeder which meters and controls chlorine gas in the DRY state. You can reduce your problems and your costs by putting this feeder to work in your plant . . . for simpler, lower maintenance and more economical chlorination every month of the year . . . and for years to come.

For full details, write for descriptive Bulletins. Builders-Providence, Inc., 356 Harris Ave., Providence 1, R. I.



**BUILDERS-PROVIDENCE**

(DIVISION OF B-I-F INDUSTRIES)





## 6 Essential Facts

for a city with a Water Problem  
... and a Budget Problem, too!

### 1. Costs Far Less to Install!

A Ranney Water Collector will add millions of gallons to your daily water supply—at a fraction of the cost of conventional systems!

### 2. Less Expensive to Operate!

A Ranney Water Collector is far less expensive to operate—uses fewer pumps, fewer personnel, less power, and usually requires no treatment facilities.

### 3. Maintenance Requirements Practically Nil!

A Ranney Water Collector requires little or no maintenance. The rate of flow through the Ranney Collector's apertures eliminates clogging and silting. No filter plant maintenance.

### 4. More Water per Unit!

A single Ranney Water Collector has produced more clear, cool water than ten conventional vertical wells.

### 5. Far Longer Life Cuts Depreciation Costs!

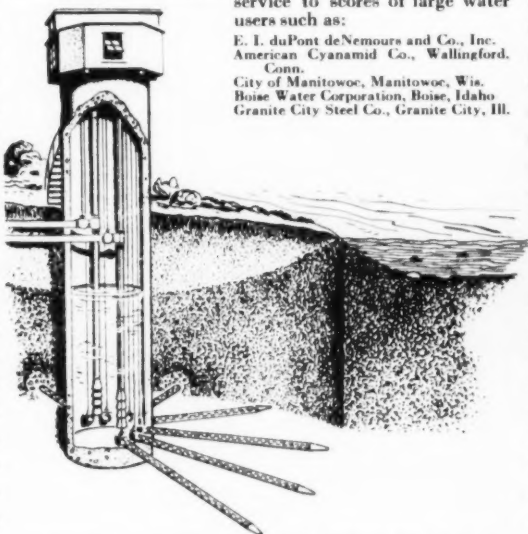
The longer life of a Ranney Water Collector lowers financing and depreciation rates appreciably.

### 6. Ask These Satisfied Users

Ranney Water Collectors are currently rendering excellent service to scores of large water users such as:

E. I. duPont de Nemours and Co., Inc.  
American Cyanamid Co., Wallingford,  
Conn.

City of Manitowoc, Manitowoc, Wis.  
Boise Water Corporation, Boise, Idaho  
Granite City Steel Co., Granite City, Ill.



An inexpensive Ranney survey will determine how the Ranney Method can work for you.

If you need water, write us for complete information on how a Ranney Water Collector will solve your problem.

**Ranney Method**  
**Water Supplies, Inc.**

HYDROLOGISTS AND WATER SUPPLY CONTRACTORS

Executive and Engineering Offices

Dept. B-7, P. O. Box 277, Columbus 9, Ohio

## ferri-floc way IS A BETTER WAY!



You Can Expect  
These Advantages With  
**Ferri-Floc-**

- |                           |                                  |
|---------------------------|----------------------------------|
| 1. Rapid Floc Formation   | 5. Bacterial removal             |
| 2. Taste and odor control | 6. Manganese and Silical removal |
| 3. Color removal          | 7. Turbidity removal             |
| 4. Ease of operation      | 8. Economy                       |

Ferri-Floc has the ability to coagulate waters and wastes over wide PH Ranges and will provide excellent flocculation in softening systems.

SULPHUR-DIOXIDE is effectively used for de-chlorination in water treatment and to remove objectionable odors remaining after purification.

**SULPHUR-DIOXIDE**  
HIGHEST  
QUALITY  
**SO<sub>2</sub>**

COPPER SULPHATE will control about 90% of the micro-organisms normally encountered in water treatment plants more economically than any other chemical.

**COPPER**  
**TC**  
**SULPHATE**



*Free Literature!*

—Send card or letter to Tennessee Corp., Grant Building, Atlanta, Georgia.

**TENNESSEE CORPORATION**

617-29 Grant Building, Atlanta, Georgia



Need more facts about advertised products? Mail your Readers' Service card now.

# DIRECTORY

## Consulting Engineers

### ALBRIGHT & FRIEL INC.

#### Consulting Engineers

Water, Sewage and Industrial Wastes Problems  
Airfields, Refuse Incinerators, Dams  
Power Plants, Flood Control  
Industrial Buildings  
City Planning, Reports, Appraisals and Rates  
Laboratory  
121 SOUTH BROAD ST. PHILADELPHIA 7

### ALVORD, BURDICK & HOWSON

#### Engineers

Water Works, Water Purification,  
Flood Relief, Sewerage, Sewage Disposal,  
Drainage, Appraisals, Power Generation  
20 No. Wacker Dr. Chicago 6, Ill.

### MICHAEL BAKER, JR., INC.

#### THE Baker Engineers

Civil Engineers, Planners, and Surveyors  
Airports, Highways, Sewage Disposal Systems,  
Water Works Design and Operation—  
City Planning—Municipal Engineering—  
All types of Surveys

Home Office: Rochester, Pa.  
Branch Offices: Jackson, Miss. Harrisburg, Pa.

### BANISTER ENGINEERING CO.

#### Consulting Engineers

POWER PLANTS, WATERWORKS, CITY  
PLANNING, RURAL ELECTRIFICATION,  
SANITATION, WASTE PROBLEMS,  
AIRPORTS, STREET IMPROVEMENTS  
1549 University Ave.  
St. Paul 4, Minn.

### BARKER & WHEELER

#### Engineers

Water Supply, Sewerage, Sewage Disposal,  
Power, Public Utility and Industrial  
Valuations and Rates

36 State Street, Albany 7, N. Y.  
11 Park Place, New York City 7

### BLACK & VEATCH

#### Consulting Engineers

Water — Sewage — Electricity — Industry  
Reports, Design, Supervision of Construction  
Investigations, Valuations and Rates

4706 Broadway Kansas City 2, Missouri

### CLINTON L. BOGERT ASSOCIATES

#### Consulting Engineers

Clinton L. Bogert Ivan L. Bogert  
J. M. Oreig Robert A. Lincoln  
Donald M. Dimars Arthur P. Ackerman  
Water and Sewage Works  
Refuse Disposal Industrial Wastes  
Drainage Flood Control  
624 Madison Ave., New York 22, N. Y.

### BOWE, ALBERTSON & ASSOCIATES

#### Engineers

Industrial Wastes—Refuse  
Reports—Designs—Estimates  
Disposal—Municipal Projects  
Airfields—Industrial Buildings  
Water and Sewage Works  
Valuations—Laboratory Service  
110 William St., New York 38, N. Y.

### BROWN ENGINEERING CO

#### Consulting Engineers

Waterworks, Sewage Disposal, Airports  
Street Improvements, Power Plants  
Electric Distribution, Rates

K. P. BUILDING DES MOINES, IOWA

### BROWN & BLAUVELT

#### Consulting Engineers

Railroads Water Supply  
Highways Sewage Disposal  
Bridges Industrial Plants  
Airports River Developments

Telephone: WHitshull 4-4797  
468 Fourth Ave., New York 16, N. Y.

### BUCK, SEIFERT AND JOST

#### Consulting Engineers

(FORMERLY NICHOLAS S. HILL ASSOCIATES)

Water Supply Sewage Disposal  
Hydraulic Developments  
Reports, Investigations, Valuations  
Rates, Design, Construction, Operation  
Management, Chemical and  
Biological Laboratories  
112 East 19th St. New York City

### BURGESS & NIPLE

#### Consulting Engineers

Established 1908

Water supply, treatment and distribution  
Sewage and industrial wastes disposal  
Investigations, reports, appraisals, rates  
Airports, Municipal Engineering, Supervision  
384 E. Broad Street Columbus 13, Ohio

### RALPH H. BURKE, INC.

#### Consulting Engineers

Traffic Studies Underground Garages  
Parking Structures Grade Separations  
Expressways, Airports and Terminal Buildings  
Shore Protection Municipal Engineering  
Parks Field Houses Swimming Pools

20 North Wacker Drive, Chicago 6, Ill.

### BURNS & McDONNELL

#### Consulting and Designing Engineers

Kansas City 2, Mo.

P. O. Box 7088



Cleveland 14, Ohio

1404 E. 9th St.

### JAMES M. CAIRD

Assoc. Am. Soc. C. E.

#### Chemist and Bacteriologist

Water Analysts and Tests of Filter  
Plants  
Office and Laboratory  
Cannon Bldg., Broadway & 2nd St.  
Troy, N. Y.

### CAMP, DRESSER & MCKEE

#### Consulting Engineers

Water Works and Water Treatment  
Sewerage and Sewage Treatment  
Municipal and Industrial Wastes  
Investigations and Reports  
Design and Supervision  
Research and Development  
Flood Control

6 Beacon St. Boston 8, Mass.

### CAPITOL ENGINEERING CORP.

#### Engineers—Constructors Management

Water Works Sewage Systems  
Design and Surveys Roads and Streets  
Planning Airports  
Bridges Dams

Executive Offices  
BILLSBURG, PENNSYLVANIA

### THE CHESTER ENGINEERS

Water Supply and Purification  
Sewage and Industrial Waste Treatment  
Power Plants—Incineration—Gas Systems  
Valuations—Rates—Management  
Laboratory—City Planning

210 E. Park Way, Pittsburgh 12, Penna.

### CHAS. W. COLE & SON

#### Consulting Engineers

Sewerage, Sewage Treatment, Industrial  
Wastes, Water Supply, Water Treatment  
Airports, Industrial Buildings  
Design and Supervision

Chas. W. Cole, Sr. Chas. W. Cole, Jr.  
Ralph J. Bushee M. J. McErlain  
220 W. LaSalle South Bend, Ind.

### CONSOER, TOWNSEND & ASSOCIATES

Water Supply — Sewage — Flood Control &  
Drainage — Bridges — Express Highways —  
Paving — Power Plants — Appraisals — Reports  
— Traffic Studies — Airports  
Gas & Electric Transmission Lines

351 East Ohio Street  
Chicago 11, Ill.

### DE LEUW, CATHER & COMPANY

#### Consulting Engineers

Public Transit, Traffic and Parking Problems  
Railroads Grade Separations  
Major Thoroughfares Expressways  
Subways Tunnels  
Power Plants Municipal Works

150 North Wacker Drive, Chicago 6, Ill.  
79 McAllister St., San Francisco 2, Calif.

### A. W. DOW, Inc.

#### Chemical Engineers

Consulting Paving Engineers

Mem. Am. Inst. Ch. Engrs.

Asphalt Bitumens, Tars, Waterproofing,  
Paving, Engineering, Materials

801 Second Avenue New York

### GANNETT FLEMING CORDRY & CARPENTER, Inc.

#### Engineers

Water Works, Sewage, Industrial Wastes &  
Garbage Disposal  
Roads, Airports, Bridges & Flood Control  
Town Planning, Appraisals, Investigations  
& Reports

Harrisburg, Pa. Pittsburgh, Pa.  
Daytona Beach, Florida

### GEORGE A. GIESEKE

#### Consulting Engineers

Municipal Engineering Problems  
Surveying—Housing Development  
Water Supply—Industrial Wastes  
Sewerage—Refuse Incineration  
Design—Supervision of Construction

1405 W. Erie Ave. Philadelphia 40, Pa.

### GILBERT ASSOCIATES, Inc.

#### Engineers and Consultants

Power Plant Engineering  
Water Supply and Purification  
Sewage and Industrial Waste Treatment  
Chemical Laboratory Service

New York Reading, Pa. Philadelphia  
Houston Washington

April 4, 1952, the pair with intermediate settlement produced final humus tank effluent having significantly lower BOD and permanganate values and higher concentration of oxidized nitrogen. However, these values were almost the same in the two effluents after they had been filtered through paper; from which it would seem that the differences in the final effluents were caused mainly by differences in the nature and amount of suspended matter present. Effluents from the pair of filters without intermediate filtration contained 7 ppm more suspended matter than those with such filtration, and the suspended matter had a higher BOD and about the same permanganate value.

"Further Research on Process of Alternating Double Filtration;" *Municipal Engineering* (England), May 22.

• • •

### Water Use in Fresno, Calif.

Daily temperatures affect the water use very materially, according to C. H. Weekes, Sup't. of the Fresno, Calif., Water Department. Average pumpage for 1950 and 1951 was 13.65 billion gallons. In 1952, the pumpage was also 13.65 billion gallons, despite the increase in industry and population. Reasons for less per capita use in 1952 were the short and cool summer and a system of rotation for lawn sprinkling. Odd street numbers watered lawns on odd numbered days of the month; even numbers on even days.

• • •

### "Doc" Symons

(Continued from page 16)

urday afternoon. It grew louder as the week wore on.—Of course, there was some reason for this unseemly attitude. The exhibitors could not get into the exhibit hall until 24 hours after they had expected; nearly all Grand Rapids' restaurants are closed on Sunday; the attendance was larger than Grand Rapids had seen before (according to the elevator operators). There weren't enough eating places downtown, service was slow, and if you weren't among the first at a restaurant, you were apt to have to change your order two or three times as the cook often ran out of what you had your heart set on, before the waitress got back to the kitchen. Crowding a large group into the smaller of the auditorium halls on Tuesday and Wednesday night while the big hall stood vacant

### GREELEY & HANSEN

Engineers

Water Supply, Water Purification  
Sewerage, Sewage Treatment  
Flood Control, Drainage, Refuse Disposal  
220 S. State Street Chicago 4

### HOWARD R. GREEN CO.

Consulting Engineers

DESIGN AND SUPERVISION OF  
MUNICIPAL DEVELOPMENTS  
Water Works and Treatment—Sewers  
and Sewage Disposal—Investigations  
and Valuations  
206-10 Beaver Bldg., Cedar Rapids, Iowa  
Established 1913

### JOHN J. HARTE CO.

Engineers

Waterworks, Sewerage, Treatment  
Plants, Gas Systems, Street and  
Storm Drainage, Improvements  
Public Buildings, Airports

ATLANTA, GEORGIA

### HAVENS AND EMERSON

W. L. Havens C. A. Emerson  
A. A. Burger F. C. Tolins F. W. Jones  
W. L. Leach H. H. Moseley J. W. Avery  
Consulting Engineers

Water, Sewerage, Garbage, Industrial Wastes,  
Valuations—Laboratories  
Leader Bldg. Woolworth Bldg.  
Cleveland 14, O. New York 7, N.Y.

### HAZEN AND SAWYER

Engineers

Richard Hazen Alfred W. Sawyer  
Water Supply and Sewage Works  
Drainage and Flood Control  
Reports, Design, Supervision of  
Construction and Operation  
Appraisals and Rates  
110 East 42nd Street New York 17, N.Y.

### HILL & HILL

Engineers

Sewage and Waste Disposal.  
Water Supply and Filtration.  
Dams, Reservoirs, Tunnels.  
Airport and Topographic Surveys  
Home Office: 8 Gibson St., North East, Pa.

### WILLIAM T. HOOPER, JR. CONSULTING ENGINEERS

Water Supply, Sewerage and Sewage  
Treatment; Municipal, Industrial,  
and Structural Design; Reports,  
Supervision, and Laboratory Service  
804 Belvidere Street Waukegan, Illinois

### FOR RATES FOR THIS SPACE

Write

### PUBLIC WORKS MAGAZINE

310 East 45th Street New York 17, N. Y.

### JONES, HENRY & WILLIAMS

(Formerly Jones, Henry & Schoonmaker)  
Consulting Sanitary Engineers

Water Works  
Sewerage and Treatment  
Waste Disposal  
Security Bldg. Toledo 4, Ohio

### FOR RATES FOR THIS SPACE

Write

### PUBLIC WORKS MAGAZINE

310 East 45th Street New York 17, N. Y.

### Engineering Office of CLYDE C. KENNEDY

◆ Water Supply  
◆ Sewage and Waste Treatment  
◆ Sewage Reclamation  
CHEMICAL and BIOLOGICAL LABORATORY  
SAN FRANCISCO

### MORRIS KNOWLES INC.

Engineers

Water Supply and Purification, Sewage  
and Sewerage Disposal, Industrial Waste,  
Valuations, Laboratory, City Planning  
1312 Park Building, Pittsburgh 22, Pa.

### HAROLD M. LEWIS

Consulting Engineer—City  
Planner

Analyses of urban problems,  
master plans, zoning, parking, airports,  
subdivisions, redevelopment.  
Reports—plans—ordinances  
15 Park Row New York 38, N. Y.

### WM. S. LOZIER CO.

Consulting Engineers

Sewerage, Sewage Disposal, Water  
Supply, Water Purification, Refuse  
Disposal  
10 Gibbs Street Rochester 4, N. Y.

### METCALF & EDDY

Engineers

Water, Sewerage, Drainage, Refuse and  
Industrial Wastes Problems  
Airfields Laboratories Valuations  
Stotler Building  
Boston 16

### BOYD E. PHELPS, INC.

Architects-Engineers

Water Supply and Purification  
Sewage & Industrial Waste Treatment  
Municipal Buildings  
Airfields, Power Plants  
Reports & Investigations  
Michigan City Indianaapolis Indiana

### PALMER AND BAKER, INC.

CONSULTING ENGINEERS — ARCHITECTS  
NAVAL ARCHITECTS — MARINE ENGINEERS

Surveys-Reports-Design-Supervision-Consultation  
Transportation and Traffic Problems  
Tunnels-Bridges-Highways-Airports-Industrial Buildings  
Waterfront and Harbor Structures, Graving and Floating Dry Docks  
Vessels, Boats and Floating Equipment  
Complete Soils, Materials and Chemical Laboratories

Mobile, Ala.

New Orleans, La.

Houston, Texas

Washington, D. C.

**MALCOLM PIRNIE ENGINEERS**

Civil &amp; Sanitary Engineers

Maxim Pirnie Ernest W. Whitlock  
Robert D. Mitchell Carl A. Arenander  
Malcolm Pirnie, Jr.  
Investigations, Reports, Plans  
Supervision of Construction and Operations  
Appraisals and Rates

25 W. 43rd St. New York 18, N. Y.

**THE PITOMETER COMPANY**

Engineers

Water Waste Surveys  
Trunk Main Surveys  
Water Distribution Studies  
Water Measurements and Tests  
Water Wheels, Pumps, Meters

New York 30 Church St.

**FOR RATES FOR THIS SPACE**

Write

**PUBLIC WORKS MAGAZINE**

310 East 45th Street New York 17, N. Y.

**Preload Engineers Inc.**

Founded—1934

Consultants in Prestressed Design  
Designers of more than 800 pre-  
stressed concrete bridges, buildings,  
tanks and pipe lines erected in  
the United States since 1934.

955 North Monroe Street, Arlington, Va.

**RUSSELL AND AXON**

Consulting Engineers

Civil—Sanitary—Structural  
Industrial—Electrical  
Rate Investigations

408 Olive St., St. Louis 2, Mo.  
Municipal Airport, Dayton Beach, Fla.**IRBY SEAY COMPANY**

Water Engineers—Water Consultants

Water Supply Water Treatment  
Water-use Survey Water Wastes

516 Goodwyn Inst. Bldg. Phone 8-2703

Memphis, Tennessee

**MILES O. SHERRILL**

Consulting Engineers—Municipal & Industrial  
Marion C. Welch 1412 Bardstown Rd.  
Associates Engineer Louisville 4, Ky.

"The Sherrill Engineers"

Water Purification & Distribution—Sewerage &  
Sewage Disposal—Surveys & Highway Location—  
Dams, Reservoirs & Area Drainage—Valuations &  
Reports—Oil & Industrial Wastes—Garbage Dis-  
posal & Incineration—Streets & Storm Drainage  
Swimming Pools A Specialty

**FOR RATES FOR THIS SPACE**

Write

**PUBLIC WORKS MAGAZINE**

310 East 45th Street New York 17, N. Y.

**FOR RATES FOR THIS SPACE**

Write

**PUBLIC WORKS MAGAZINE**

310 East 45th Street New York 17, N. Y.

**SMITH & GILLESPIE**

Municipal and Consulting Engineers

Water Supply, Water Purification,  
Sewerage, Sewage Disposal, Drainage  
Refuse Disposal, Gas Systems, Power Plants  
Airports

Jacksonville

Florida

**STANLEY ENGINEERING COMPANY**

Consulting Engineers

Airports—Drainage  
Electric Power—Waterworks  
Sewerage—Valuations—Rate Studies  
Municipal Buildings

Hershey Building

Muscatine, Ia.

**ALDEN E. STILSON & ASSOCIATES**

Limited

Consulting Engineers

Water Supply, Sewerage, Waste Disposal,  
Bridges—Highways—Industrial Buildings  
Studies—Surveys—Reports

Surveys, Reports, Appraisals  
209 So. High St. Columbus, Ohio**J. STEPHEN WATKINS**

J. S. Watkins G. R. Watkins

Consulting Engineers

Municipal and Industrial Engineering, Water  
Supply and Purification, Sewerage and Sewage  
Treatment, Highways and Structures, Reports,  
Investigations and Rate Structures

251 East High Street Lexington, Kentucky  
Branch Office  
901 Hoffman Building Louisville, Kentucky**WHITMAN, REQUARDT**

and Associates

Engineers — Consultants

Civil—Sanitary—Structural

Mechanical—Electrical

Reports, Plans, Supervision, Appraisals

1301 St. Paul St., Baltimore 2, Md.

**NOW**

is the time to send your reservation  
in for space in this directory. Rates  
will be sent on request.

Write

**PUBLIC WORKS MAGAZINE**310 East 45th St.  
New York 17, N. Y.**ROBERT AND COMPANY ASSOCIATES***Architects and Engineers*

ATLANTA

WATER SUPPLY • SEWAGE DISPOSAL • INCINERATORS • POWER PLANTS

was not exactly appreciated by the standees—and so on went the critical comment.

It wasn't all "beefs", however.—The smorgasbord on Sunday night was delectable; the entertainment on Wednesday, including the noisy Klompen Dancers, was tops; the dinner in the Auditorium on Thursday was delicious, well served and attractively decorated; Morrison Cunningham's short address as incoming president of AWWA drew raves from everyone as one of the best ever;—and the dancing on Monday and Wednesday was quite enjoyable, although the orchestra didn't play enough tangos to suit me and did play too many mambos, a dance which I can't do—and neither could anyone else.

★ ★ ★

For the square dancers—and they are becoming more legion—there was a whole evening of fun. Arthur Buswell (Chief, Illinois State Water Survey) offered to teach me the Do-ce-do—said he's taught me a few other things once and thought I could learn some more—I declined—said I'd stick to Arthur Murray.

★ ★ ★

Daytimes around Grand Rapids were crowded with two or three convention sessions at a time, conferences everywhere, confabs here and there, chats with old and new friends, and coke drinking on the house.—John Stewart, WSWMA Manager, reports that 4056 bottles of coke were consumed at G.R. as compared with 3028 at K.C. last year—and it was not hotter in Grand Rapids than in Kansas City. Must have been better attendance at the exhibit hall (or perish the thought: Exhibit Hall attendance wasn't so good and the manufacturers' representatives had more time to drink coke).

★ ★ ★

Well, what d'ya'know—I'm out of space and there's more to tell—about the ladies, hats, etc.,—about the rump sessions I attended, particularly the Wisconsin breakfast and the Society of Council Bluffers; about some of the speakers and their witticisms;—about some of the quips I heard, or overheard while room hopping; and about the trip home—and I'll be writing the next column in June, when I'll give you a blade by blade description of my encounter with the surgeon's scalpel.

V.T.Y.—Doc Symons





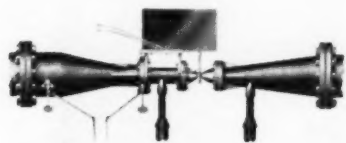
## Public Works

# EQUIPMENT

## NEWS

### Non-Clog Venturi Type Sludge Controller

To control the flow of sludge or other liquids containing a good deal



Meters sludge better

of solids, Simplex makes this 8-inch diameter squeeze controller. It is claimed to overcome most of the difficulties in controlling such flows. Even corrosive materials do not affect it. The core is a venturi tube with a throat section of flexible rubber. The flexible rubber section has no pockets or restrictions which can trap materials. Not only is the flow measured accurately, but the device operates over a wide range. Data from Simplex Valve & Meter Co., Philadelphia 42, Pa.

Use Coupon on page 28; circle No. 7-1

### These Rotary Mowers Can Also Mulch Leaves

Rotary cutters and mowers are used for cutting and shredding weeds, mowing grass down to one inch, cutting brush as thick as a man's wrist, etc. Bottles and similar refuse will not harm the blades. With a simple attachment it is possible to mulch leaves to a fine dust without need for raking or hauling. More data are available from Wood Brothers Mfg. Co., Box 148B, Oregon, Illinois.

Use coupon on page 28; circle No. 7-2

### Diatomite Filter With Large Flow Capacity

With this new type diatomite filter, fine uniform filtering can be provided for large volumes of water. Filters are available in sizes from 25 to 1000 sq. ft. of filtering surface; and with capacities up to 2½ mgd per unit. Experience shows that these units will remove colloidal and suspended matter completely, and upward of 80 percent of the bacteria. Full information from Sparkler Mfg. Co., Mundelein, Ill.

Use coupon on page 28; circle No. 7-3

### Vitrified Clay Pipe with Plastic Connections

This is a combination of premium grade vitrified pipe and plastic con-



Plastic joints for clay pipe

nections which are formed by a plastic casting at either end. The pipe can be hung from straps or laid in trenches. The pipe and the jointing material is resistant to 54 corrosive acids and most gases. It can be assembled very easily. Called "Screw-Seal", this pipe is made in standard 3-ft. lengths, in 4-, 6- and 8-inch sizes. Joints are said to stay tight under practically all conditions of expansion and contraction. More from Robinson Clay Product Co., Akron, Ohio.

Use coupon on page 28; circle No. 7-4

### Reducing Cleaning Costs on Construction Equipment

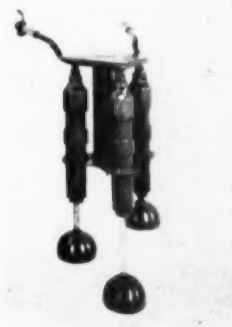
Large cost savings are reported when using a special dip machine for cleaning parts of highway and other construction equipment. The No. 5 Aja-Dip machine has capacity enough to take the largest parts, which can be cleaned in 2 hours; smaller parts are cleaned in an hour; and miscellaneous small parts in 10 to 20 minutes. Cost reduction is claimed to be 80 percent. Magnus Chemical Co., Inc., Garwood, N. J.

Use coupon on page 28; circle No. 7-5

### For Efficient and Economical Backfill Compaction

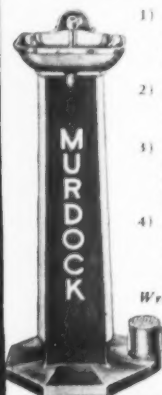
This is an air-driven tool designed to speed up backfill compaction. It is a triplex unit, which is faster, and gives heavier impact and more vibration to the soil. With 2100 blows per minute, compaction is to the same density as the standard model, but higher lifts can be used. It is stated that 75 percent may be saved on backfill costs. Gunderson-Taylor Machinery Co., 988 Cherokee St., Denver, Colo.

Use coupon on page 28; circle No. 7-6



Speeds compaction

### ISN'T THIS WHAT YOU'RE LOOKING FOR?



- 1) *Prevents water waste*—cannot be left on accidentally due to foot operation.
- 2) *Non-Freezing*—can be used outdoors in any weather.
- 3) *Trouble-free*—seldom requires more attention than washer replacement.
- 4) *Long Service*—inner works of brass and bronze defy wear for years.

Write for FREE Catalog.

The MURDOCK Mfg. &  
Sup. Co.  
Cincinnati 2, Ohio

**MURDOCK**

**OUTDOOR  
DRINKING  
FOUNTAINS**

**HYDRANTS**

**STREET  
WASHERS**

ANTI-FREEZING  
COMPRESSION  
HYDRANT

SELF CLOSING  
ANTI-FREEZING  
HYDRANT

### Adjustable VALVE BOXES

#### TWO PIECE

sliding or screw type cast iron valve boxes for covering 4" through 10" valves for water or gas. Rugged construction for life-time service. 5 1/4" shaft. Extensions as required.

#### THREE PIECE

valve boxes supplied with separate bases are available in sliding or screw type. Made with 5 1/4" and 7" shafts with extensions as required. Also, a complete line of service and roadway Boxes.

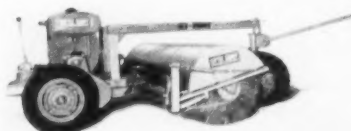
**General Sales Offices**  
ANNISTON, ALABAMA

We invite inquiries to our nearest sales office  
122 So. Michigan Avenue Chicago 2, Ill. 230 Fifth Avenue New York 1, New York

**ALABAMA PIPE CO.**  
ANNISTON ALABAMA

### Two Trailer Type Power Sweepers For Many Jobs

One of these sweepers is self-powered, the other receives its power from the pulling tractor or jeep. The "Hy-Port" sweeper is



New power sweeper

driven by an air-cooled engine; it sweeps at any angle up to 30° right or left and has a sprinkler attachment. Brooms are available in 7 or 8-ft. widths. The PTO is a one-man sweeper, with power takeoff from the tractor or Jeep. Broom is 7 ft. wide; angle is to 30°. Both sweepers are designed for highway departments contractors, parks, airports and playgrounds. Little Giant Products, Inc., Peoria, Ill.

Use coupon on page 28; circle No. 7-7

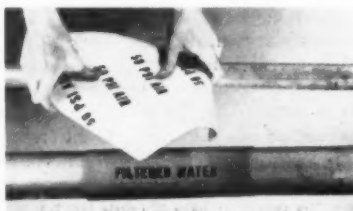
### Convenient Storage for Valuable Small Parts

Storage of small parts can be facilitated with the new "Little Gem" Tiny Parts Cabinet, a two-drawer unit furnished with adjustable dividers with 24 separate compartments. Several units may be stacked in a single interlocking assembly, or the cabinets may be inserted in place of plain drawers in Standard Parts Cabinet. Both cabinets are supplied by Precision Equipment Co., 3714 Milwaukee Ave., Chicago 41, Ill. For further details, check the coupon on page 28.

Use coupon on page 28; circle No. 7-8

### Identifying Piping by Ready Made Plastic Labels

An easily installed pipe identification system that requires no protective coating uses ready made Vinyl-ite plastic labels. Corrosive condi-

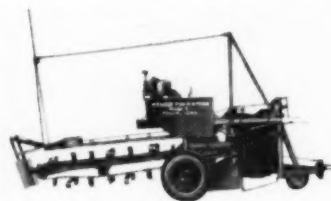


tions, temperature changes and moisture have no effect on these labels, nor do oil, grease, acids and alkalies. The labels are colored and worded to fit exact requirements; and they fit any size of pipe up to 30-inch. The labeling is large enough to be read at a distance. Their use can solve some of the problems in water and sewage plants. More from Wilmington Plastics, Inc., 810 S. Heald St., Wilmington, Del.

Use coupon on page 28; circle No. 7-9

### Digging Water, Sewer and Gas Lines to 6 Ft. Deep

There are three models of this handy ditcher: The Model 24 is for cutting normal trenches for water, sewer and gas lines to 24 ins. deep and for foundation trenches; the 6-V has an adjustable V-blade and is designed for drainage ditches; the



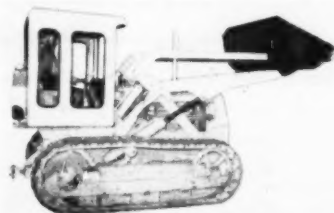
Light handy trencher

model 6 will dig 6 ft. deep and to 18 ins. wide. Controls keep ditcher digging straight down on slopes and curves. The conveyor throws dirt to one side of trench. Power is furnished by a 12-hp air-cooled engine. More information from Vermeer Mfg. Co., Pella, Iowa.

Use coupon on page 28; circle No. 7-10

### Heavy Duty Cabs for Installation on Traxcavators

These heavy-duty cabs are designed for installation on Caterpil-



lar HT4 traxcavators. They are entirely of steel, and welded, with reinforcing framing. The windshield is heavy safety glass; doors may be fastened in open position. Design permits maximum visibility and a view of the dozer blade at all times. The cab is easy to mount, since it

bolts directly to the tractor fender and hydraulic lines do not need to be broken. Weight is about 700 pounds. More information from Crenlo, Inc., Rochester, Minn.

Use coupon on page 28; circle No. 7-11

• • •

### Giant Size Steam Cleaner Can Operate Two Steam Guns

For cleaning equipment, this large steam cleaner can deliver 200 gallons of combined saturated steam and cleaning detergent per hour, with a pressure of 130 psi. This cleans very quickly; and full steam can be generated in two minutes. Available as either a portable or a stationary unit, the weight is 1050 lbs. More data from Quick Charge, Inc., 1750 NE 10th St., Oklahoma City, Okla.

Use coupon on page 28; circle No. 7-12

• • •

### Multiple Disc Assembly for Smoothing Pavements

The Shav-O-Disc attachment fits and operates on the scarifier controls of any make or model of motor



graders and leaves the grader blade in full operation. It cuts its own furrows to a width of 64 inches and, operating under the full weight of the grader to which it is attached, can be readily adjusted to cut to any desired depth. This disc attachment weighs 1740 pounds. It is built in two sections opposed which eliminates side thrust. Full information may be obtained from T & M Manufacturing Co., Bakersfield, California.

Use coupon on page 28; circle No. 7-13

• • •

### Fog-maker Kills Insects and Is Easy to Use

In "Swingfog," a gasoline-fueled pulse-jet heater forces a pest-killing formulation automatically into the



# GUNITE

SPECIALISTS



PRESTRESSED TANKS  
SWIMMING POOLS

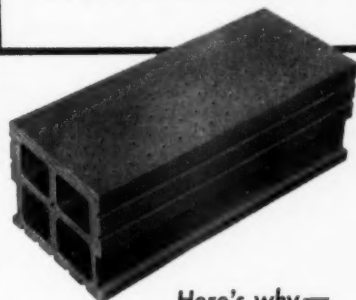
RESERVOIRS

SEWERS  
DAMS

EASTERN GUNITE  
COMPANY

ELKINS PARK, PA.

IT PAYS TO *Specify*  
**LEOPOLD**  
Glazed Tile  
**FILTER BOTTOMS**



Here's why—

Permanent • No corrosion or tuberculation • Equal distribution • Low loss of head • Requires only small sized gravel • No metal in contact with water!

Write today for details

**F. B. Leopold Co., Inc.**

2413 W. Carson Street  
Pittsburgh 4, Pa.

### WATER SUPERINTENDENTS:

### Consider the Advantages of Pollard L-P Gas Burner Furnaces

Burns L-P Gas (commonly known as "Bottled Gas"). Thoroughly tested and proven. Melts approximately 50 lbs. of lead in 9 minutes. Flame can be adjusted to maintain desired temperature. One cylinder of gas will operate unit for many hours. Cylinders are made of armor plate.

Catalog No. 26 on Request.

JOSEPH G. POLLARD CO., Inc.  
PIPE LINE EQUIPMENT  
New Hyde Park, N. Y.



# HYDRO-TITE

## DEPENDABLE JOINTING COMPOUND

Seals Bell and Spigot Water Mains

Economical—Effective

Over 35 Years Of Dependable Performance

—HYDRAULIC DEVELOPMENT CORP.—

MAIN SALES OFFICE 50 CHURCH ST., N.Y.C.

General offices and works W. Medford Sta., Boston, Mass.



Get full details of this month's new products... mail your Readers' Service card today.

## CLASSIFIED ADVERTISING

## FOR SALE

Model L551 Link-Belt Speeder combination  
Dragline and Trench Hoe. A-1 condition.  
**Dukehart-Hughes Tractor & Equip Co.**  
Des Moines, Iowa

International "A" Tractors with side  
mowers. Excellent condition. \$950.00  
each.

**Service Supply Corporation**  
20th & Erie Ave., Philadelphia 40, Penna.  
Baldwin 9-1950

**WANTED TO BUY**  
CAST IRON BELL & SPIGOT  
AND FLANGED FITTINGS.  
SEND US YOUR LISTS OF  
SURPLUS STOCKS.

**INDUSTRIAL IRON WORKS**  
Post Office Box 4625  
Portland 2, Oregon

## FOR SALE

1—Northwest  $\frac{3}{4}$  yd. 25 Backhoe  
Shovel 10 yrs. old with Diesel  
Motor and 1 Lorain 41 Model  
3 $\frac{1}{2}$  years old. Backhoe with  
Diesel G.M.

Price Lorain .....\$12,000  
Northwest  $\frac{3}{4}$  yd. ....\$ 8,000

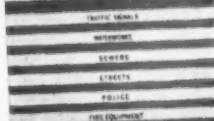
**FARINO EXCAVATING CO., INC.**  
18030 Riatta Street  
Melvindale, Michigan

MANUFACTURER'S  
REPRESENTATIVES  
WANTED

to sell to counties, cities and towns—  
a complete line of Traffic Signs utilizing  
Reflexite, the reflecting material now  
used on super highways such as Merritt  
Parkway, New Jersey Turnpike, etc. Also  
barricades, delineators, street name  
signs and traffic paint.

For complete information, write to

**Reflexite Corp.**  
63 Wall Street, New York 5, N. Y.

MUNICIPAL  
SUPPLIES

**W.S. DARLEY & CO.**  
CHICAGO, ILLINOIS

**W. S. DARLEY & CO., Chicago 12**

WRITE  
TODAY  
FOR  
TOO  
PAGE  
CATALOG

end of the tube. When the exhaust  
hits the atmosphere, the resulting  
condensation forms a fog which is  
highly effective in killing all kinds  
of insects. The apparatus weighs  
about 30 pounds, fully charged. It  
can be modified easily and used as a  
flame thrower to kill weeds, etc.  
More information from Devenco,  
Inc., 150 Broadway, New York,  
N. Y.

Use coupon on page 28; circle No. 7-14

Overdrive Available for  
Caterpillar 4-Wheel Tractors

An overdrive has been developed  
for the DW20 Caterpillar 4-wheel  
tractors which gives top speeds up  
to 34 mph. Combined with the pres-  
ent transmission, these tractors can  
now have 10 speeds forward and  
two reverse. The overdrive is avail-  
able as an attachment on new ma-  
chines or for installation on units  
now in the field by means of a spe-  
cial package. More from Cater-  
pillar Tractor Co., Peoria, Ill.

Use coupon on page 28; circle No. 7-15

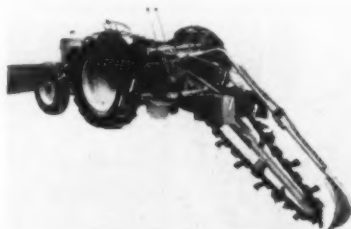
Intermittent Type Wet or Dry  
Automatic Sampler

In this automatic sampler, which  
is suitable for either wet or dry  
sampling, a gear motor operates  
only at intermittent intervals, con-  
trolled by a motor driven time  
switch. This can be set for intervals  
of 2 to 55 minutes. Complicated  
wiring circuits have been elimi-  
nated. Electrical characteristics are  
single phase, 60 or 50 cycle, 115 or  
230 volts. Denver Equipment Co.,  
1400 17th St., Denver 17, Colo.

Use coupon on page 28; circle No. 7-16

Light Weight Trencher for  
Many Kinds of Digging

The "Trench-Hog" is a light  
weight trenching unit for Ford and  
Ferguson tractors. It can be



equipped with booms for digging to  
depths of 3 $\frac{1}{2}$  to 7 ft. It is available  
with standard cutters for ordinary  
and sticky soils in widths of 6 to  
20 ins.; and with special cutters for

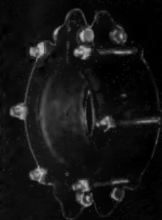
FOR REPAIRING  
BELL AND SPIGOT  
JOINT LEAKS...

**SKINNER-SEAL**  
Bell Joint Clamp for  
stopping bell and  
spigot joint leaks  
under pressure. Gas-  
ket is completely  
sealed: at bell face  
by Monel Metal Seal  
band — at spigot by  
hard vulcanized  
gasket tip. 2" to 42".

## AND BROKEN MAINS

## SKINNER-SEAL

Split Coupling  
Clamp. One man  
can install in 5 to  
15 minutes. Gasket  
sealed by Monel  
band. Tested to  
800 lbs. line pres-  
sure. A lasting re-  
pair. 2" to 24" incl.



**M. B. SKINNER CO.**  
SOUTH BEND 21, INDIANA, U.S.A.

the search  
for  
**PURE WATER**  
354 B.C.

"Hippocrates' sleeve" (a  
cloth straining bag) was  
a popular water treat-  
ment method in the  
4th Century  
B.C.

For excellence  
in MODERN water  
treatment  
equipment

—gravity and  
pressure filters—  
recirculation  
apparatus...

MECHANICAL EQUIPMENT  
BY  
**ROBERTS FILTER MFG. CO.**  
DARBY, PENNA.

**ROBERTS FILTER  
MANUFACTURING CO.**  
640 COLUMBIA AVE., DARBY, PA.



extremely hard and rocky soils in widths of 7 through 18 ins. Many accessories are available, including one-side delivery, high speed sprocket, bulldozer blade and crumbler. Arps Corp., New Holstein, Wisc.

Use coupon on page 28; circle No. 7-17

### Syndet Comparator for Synthetic Detergents in Sewage

The colorimetric determination of anionic synthetic detergents in sewage is now possible with this new Taylor comparator. It comes complete with color standards and reagents. Your sewage plant operator can manipulate this and it will tell him whether or not syndets (synthetic detergents) are causing trouble. More data from W. A. Taylor & Co., 7304 York Road, Baltimore 4, Md.

Use coupon on page 28; circle No. 7-18

### Hydra-Lift Now Has Hydraulically Operated Outriggers

The addition of hydraulically operated outriggers to the Pitman Hydra-Lift markedly speeds up work where outriggers must be used frequently, as in stringing pipe, pulling forms and unloading heavy materials. The operator can raise and lower the outriggers instantly without leaving his regular station. More data on these from Pitman Mfg. Co., 300 West 79th Terrace, Kansas City, Mo.

Use coupon on page 28; circle No. 7-19

### Light Portable Detector for Gamma Radiation

For purposes of civil defense, the Radector is made in two models—AG-50 and AG-500. The former measures from 0.05 to 50 mr/hr; and from 0.05 to 50 R/hr. The AG-500 measures from 0.5 to 500 mr/hr and from 0.5 to 500 R/hr. Power is from 4½V pen-light batteries, without amplification. Weight is 3 lbs. Accuracy is within 15%. Jordan Electronic Mfg. Co., Inc., 119 E. Union St., Pasadena, Calif.

Use coupon on page 28; circle No. 7-20

### Tractor-Backhoe-Loader-Dozer is Useful

In trenching for pipe, laying the pipe and backfilling the trenches, Burley, Idaho, Melvin G. Lewis, Water Superintendent, has found an Allis-Chalmers HD-5G, with backhoe, loader and bulldozer attachments to be very useful.

## W. S. ROCKWELL Butterfly Valves

Minimum Pressure Drop

Automatic or Manual Control

for Any Operating Condition to 300 p.s.i. and 2000° F.

of any metal or rubber-lined in sizes to 120"



## W. S. ROCKWELL COMPANY

BUTTERFLY VALVES • SLIDE VALVES • AUTOMATIC VALVES

2523 ELIOT STREET • FAIRFIELD, CONN.

Sales Representatives in Principal Cities



Now AVAILABLE **TEALE** Dozer-Loader

For **HARD WORK** this **COMBINATION DOZER-LOADER** Use on **REGULAR CRAWLER TRACTOR**

The Teale Dozer-Loader is a quality-constructed combination that can be put on regular or modified crawler tractors. It is heavy duty and built for hard work. Put it on—take it off—easily. Price for COMPLETE LOADER, exclusive of dozer blade includes Hydraulic pump, HYDRECO heavy-duty valve, and all parts necessary to mount on your tractor, ready for work. NO MODIFICATION OF TRACTOR IS NECESSARY.

MADE FOR and PRICED AT—TD-9, D-4 and HD-5

Complete . . . . . \$1850.00

TD-6, D-2, and Cletrac A & B

Complete . . . . . \$1775.00

Write Today for Specification Folder and name of your nearest dealer.

DEALERS TERRITORY OPEN

For Quick Action, Address Dept. W.

**TEALE & CO. P.O. Box 308 Omaha, Nebraska**

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.



## SODIUM FLUOSILICATE

(Silico Fluoride)

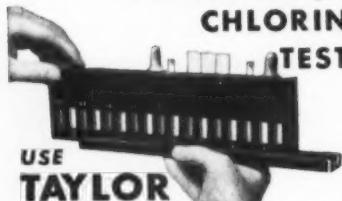
**Inquiries  
Invited**

TENNESSEE **TC** CORPORATION

1028 CONNECTICUT AVE., N. W.  
WASHINGTON 6, D. C.

## HOW TO MAKE

### ACCURATE pH, CHLORINE TESTS



## USE TAYLOR COMPARATORS

You can make determinations in a few seconds. Taylor Sets are lightweight, easy to carry for on-the-spot tests, or use in lab. Each set complete with reagents and accessories.

### Easy as A • B • C

- Fill three test tubes with sample to be tested and place them in the base.
- Add reagent to middle tube only.
- Place color slide on base, move across until colors match, and... THERE'S THE VALUE!

**Guaranteed Color Standards!**  
Sealed-in-plastic color standards carry unconditional guarantee against fading. No single standards to handle. Each slide contains a complete set of standards for any one determination.

SEE YOUR DEALER for equipment. Write direct for FREE HANDBOOK on pH and chlorine control in 34 basic industries. Also illustrates and describes all Taylor Sets.



**W. A. TAYLOR AND CO.**  
7304 YORK RD. • BALTIMORE-4, MD.

## INDEX OF ADVERTISEMENTS

Adams Mfg. Co., J. D.	25	Industrial Materials Co.	12 & 13
Alabama Pipe Co.	116	International Harvester Co.	8 & 9
Albright & Friel, Inc.	112		
Allis-Chalmers Co.	17	Jaeger Machine Co.	109
Alvard, Burdick & Hawson	112	Jones, Henry & Williams	113
American Bitumuls & Asphalt Co.	18		
Amman Photogrammetric Engrs., Jack	82	Knowles, Inc., Morris	113
Atlas Mineral Products Co.	90	Kennedy, Clyde C.	113
Ayer-McCarel Clay Co., Inc.	12 & 13		
		Lakeside Engrg. Corp.	46
Baker, Jr., Michael	112	Leopold, F. B.	117
Bannister Engineering Co.	112	Lewis, Harold M.	113
Barber-Greene Co.	39	Link-Belt Co.	89
Barco Mfg. Co.	16	Lack Joint Pipe Co.	123
Barker & Wheeler	112	Lazier & Co., Wm. S.	113
Black & Veatch	112		
Blackburn-Smith Mfg. Co.	109	Marlow Pumps	34
Blaw-Knox Co.	30	McConaughay, K. E.	103
Bogert Assoc., Clinton L.	112	M. & M. Valve & Fittings Co.	78
Bowe, Albertson Assoc.	112	McWane Cast Iron Pipe Co.	94
Bowerston Shale Co.	12 & 13	Metcalf & Eddy	113
Brown Engineering Co.	112	Mobil-Sweeper Div. of Conveyor Co.	35
Brown, Francis L.	112	Morse Brothers Machinery Co.	80
Buck, Seifert & Jost	112	Mueller Co.	41
Builders Providence, Inc.	110	Murdock Mfg. & Supply Co.	116
Burgess & Nipple	112		
Burke, Inc., R. H.	112	National Clay Pipe Mfrs., Inc.	10
Burns & McDannell Engr. Co.	112	Natco Corp.	12 & 13
Butler Mfg. Co.	23	Natural Rubber Bureau	6
		NuBane Co., Inc.	48
Caird, James M.	112		
Camp, Dresser & McKee	112	Pacific Coast Borax Co.	102
Capitol Engineering Corp.	112	Pacific Flush Tank Co.	44
Carborundum Co.	95	Pacific States Cast Iron Pipe Co.	94
Caterpillar Tractor Co.	4, 50, 101, 81	Palmer & Baker, Inc.	113
Champion Corp.	30	Palmer Filter Equip. Co.	108
Chester Engineers	112	Paper-Calmenson & Co.	33
Chicago Bridge & Iron Co.	85	Permutit Company	49
Chicago Pump Co.	3	Phelps, Inc., Boyd E.	113
Classified Ads	118	Pirie Engineers, Malcolm	114
Cole & Sons, Chas. W.	112	Pitman Mfg. Co.	22
Combustion Engineering, Inc.	107	Pittsburgh-Des Moines Steel Co.	77
Consoer, Townsend & Assoc.	112	Pitometer Company	114
Conveyor Co., The	35	Pallard Co., Joseph G.	86 & 117
		Pomona Terra-Cotta Co.	12 & 13
Darley & Co., W. S.	118	Portland Cement Assn.	45
DeLeuw, Cather & Co.	112	Preload Co.	114
Dampster Brothers, Inc.	27		
Detroit Civil Service	108	Quinn Wire & Iron Works	44
Dickey Clay Mfg. Co., W. S.	12 & 13		
Dolge Co., C. B.	46	Ranney Method Water Supplies, Inc.	111
Daw, A. W., Inc.	112	Ridge Tool Co.	24
Dresser Industries, Inc.	112	Ric-wil Co.	38
(See Dresser Mfg. Div.)		Robert & Co.	114
(See Roots-Connersville Blower Corp.)		Roberts Filter Mfg. Co.	118
Drott Mfg. Corp.	8 & 9	Rockwell Co., W. S.	119
		Roots-Connersville Blower Corp.	20
Eastern Gunita Co.	117	Russell & Axon, S. Engrs.	114
Elliott & Co., M. A.	86		
		Seay Co., Irby	114
Fairbanks-Morse & Co.	31	Shawnee Mfg. Co., Inc.	104
Fisher Research Lab., Inc.	44	Sherman Products, Inc.	88
Flexible Sewer-Rod Equipment Co.	48	Sherrill, Miles O.	114
Ford Meter Box Co.	96	Simplex Valve & Meter Co.	42
Foster Engrg. Co.	93	Skinner Co., M. B.	118
		Smith-Bair, Inc.	98
Galion Iron Works & Mfg. Co.	2	Smith & Gillespie	114
Gannett, Fleming, Cordroy & Carpenter, Inc.	112	Sparkley Mfg. Co.	32
Gar Wood Industries Inc.	21	Stanley Engineering Co.	114
Gieseke, George	112	Stillson Assoc., Alden E.	114
Gilbert Associates, Inc.	112		
Goldak Co.	38	Taylor & Co., W. A.	120
Government Employees Insurance Cos.	121	Teale & Co.	119
Grace Sign & Mfg. Co.	36	Tennessee Corp.	111 & 120
Greeley & Hanson	113	Texas Vittrified Pipe Co.	12 & 13
Green Co., Howard R.	113	Toledo Pipe Threading Mach. Co.	122
Greenlee Tool Co.	14	Tricking Filter Floor Institute	12 & 13
		Trojan Mfg. Co.	40
Harte Co., John J.	113		
Havens & Emerson	113	Union Metal Mfg. Co.	15
Hazen & Sawyer	113		
Heil Co.	37	Wallace & Tiernan Co., Inc.	Back Cover
Hellige, Inc.	40	Watkins J. Stephen	114
Hill & Hill	113	Weston Co., L. A.	44
Homestead Valve Mfg. Co.	91	White Motor Co.	47
Homelite Corp.	43	Whitman, Requaup & Assoc.	114
Hooper, William T.	113	Wolverine Tube Division	87
Huber Mfg. Co.	29	Calumet & Hecla, Inc.	105
Hunt Machine Co., Rodney	19	Wood Bros. Mfg. Co.	97
Hydrauger Corp., Ltd.	104	Wood Co., R. D.	97
Hydraulic Development Corp.	117	Worthington Corp.	11 & 26

## PUBLIC WORKS

# ENGINEERING DATA

### Cost of Laying Water Pipe in Toledo, Ohio

During 1952, 13 water lines with a total length of 11,498 ft. were laid by the Toledo, O., Water Department. Average length of lines was 884 ft. and the total cost was \$56,221.62, of which \$31,199.09 represented material cost. Of these lines, all but two were 6-inch. The exceptions were an 8-inch line 465 ft. long, which cost \$6.28 per ft., and a 4-inch line 173 ft. long which cost \$7.65 per ft. The average cost per foot of 6-inch line, according to length was: Up to 500 ft. long, \$6.86 per ft.; 501 to 1000 ft. long, \$5.53 per ft.; and over 1000 ft. long, \$3.58 per ft. The actual cost of engineering services on all lines was \$2234.52, or 3.97 percent of the total. With a 20 percent overhead charge, the engineering services amounted to 4.77 percent.

In comparison, in 1951 18 lines were laid with an average length of 823 ft. Average costs for 6-inch line were as follows: Length to 500 ft., \$6.57 per ft.; 501 to 1000 ft. long, \$5.17; and over 1000 ft., \$4.07.

George J. Van Dorp is Water Commissioner. These cost data were furnished up by Paul Kiel, Construction Engineer.

### Cost of Laying Water Mains, Augusta, Me.

During 1952, a total of 5,535 ft. of water mains were constructed by the Augusta Water District, Augusta, Me., S. S. Anthony, Superintendent and Engineer. Of these mains, 1455 ft. were 6-inch. The cost, including five 6-inch valves, averaged \$4.70 per foot, made up of the following items per foot: Labor \$1.59; equipment \$0.86; materials \$2.25. One section 216 ft. long involved much rock excavation and cost \$8.70 per ft. For the 3,480 ft. of 8-inch pipe, including twelve 8-inch valves, average cost per foot was \$4.50, made up of the following items: Labor \$0.86; equipment \$0.29; materials \$2.96; and other charges \$0.39 per foot. The cost for laying 600 ft. of 2-inch pipe was 71 cents per foot.

### Plant Improvements Reduce Taste and Odor Problem

Valparaiso, Ind., has just completed a water treatment plant addition of 2 mgd capacity and 16 miles of distribution line replacement. The new clarifier, with mechanical sludge removal, has been very helpful in producing a better water, aiding especially in the control of tastes and odors. This has previously been a severe problem because the supply comes from a shallow lake. Water use has increased 12 percent in the past two years. Richard Coote is Sup't. of Filtration.



# I SAVED 30% ON MY AUTO INSURANCE

Now, you can save up to 30% from standard manual rates on your automobile insurance with **GOVERNMENT EMPLOYEES INSURANCE**. By insuring only **PREFERRED-RISK** federal, state, county or municipal government employees and by eliminating agents and expensive branch offices, you obtain large reductions in premium rates. Special rates are also available to you for Life Insurance.

## Send Today and Save!

### GOVERNMENT EMPLOYEES INSURANCE COS.

(Capital Stock Companies . . . Not Affiliated with the United States Government)

GOVERNMENT EMPLOYEES INSURANCE BLDG., WASHINGTON 5, D. C.

NAME \_\_\_\_\_ AGE \_\_\_\_\_

ADDRESS \_\_\_\_\_ CITY \_\_\_\_\_ STATE \_\_\_\_\_

Car Year..... Make..... Model..... ☐ New

Type Body.....No. Cyl..... Purchased / / ☐ Used

Anticipated Mileage Next 12 Months..... Age of Youngest

Driver in Your Household.....

Is Car Used for Business Purposes Other Than to and from Work?

☐ Yes ☐ No

Please send me low-cost Life Insurance information ☐

Please send.....auto insurance rate inquiry cards for distribution to my associates.

80

# TOLEDO SELLS ONLY THROUGH ITS DISTRIBUTORS

No other method of distribution has ever matched Manufacturer to Distributor to User.

It's the most economical short cut to getting goods promptly to users.

Our 50 years experience in marketing the TOLEDO line of pipe tools and power pipe machines has proven this fact beyond a doubt.

## Advantages for YOU!

**ECONOMY**—Buying many products from one source simplifies your problems of purchasing, selling, bookkeeping and storage.

**SPEED**—Your Distributor carries large stocks of equipment you need for immediate delivery.

**RELIABILITY**—Your Distributor is your friend and neighbor. Rely upon him. He serves you well.

**PERSONAL CONTACT**—Your Distributor's salesmen are ready at all times to help you in emergencies

Depend on your Distributor and TOLEDO for reliable service at all times. The Toledo Pipe Threading Machine Co., Toledo, Ohio.

"TOLEDO"  
Mark of Quality  on Fine  
Pipe Tools

## Worth Telling

by Arthur K. Akers



★ **R. S. (STEVE.) RANKIN**, manager North American Sanitary Sales, **THE DORR COMPANY**, Stamford, Conn., was elected president of the **WATER & SEWAGE WORKS MANUFACTURERS ASSOCIATION**, to take office Jan. 1. **HARVEY S. HOWE**, **LOCK JOINT PIPE COMPANY**, will be vice president; **HUBERT F. O'BRIEN**, **The A. P. SMITH MANUFACTURING COMPANY**, treasurer. Reappointments, **JOHN G. STEWART**, Manager; **DOROTHY E. DIMMERS**, secretary.

★ **8 NEW ST. PAUL** "Pax-All" refuse collection units will permit the city of Lima, Ohio, to take over this job from private haulers.

★ **PROF. EARLE B. PHELPS** of the University of Florida passed away on May 29th. He had just been advised of an award by the A. P. H. A. in recognition of his "outstanding achievements across the years for public health." Formation of an Earle B. Phelps Memorial Fund is also under discussion, to commemorate his great service in the field.



Prof. Phelps



Mr. Clow

★ **J. BEACH CLOW**, vice president of **JAMES B. CLOW & SONS**, Chicago, and president of its two subsidiaries, **The EDDY VALVE COMPANY** and **the IOWA VALVE COMPANY**, died May 5th.

★ **NIAGARA ALKALI COMPANY**, of New York, announces **JAMES E. FERRIS** as director of sales and **M. F. McCOMBS**, manager Chlor-Alkali sales. Both positions are newly created.

★ **ARTHUR O. TERREL** is now assistant eastern district manager, **STANDARD STEEL WORKS**, Kansas City, at their Englewood, N. J. offices.

★ **CATERPILLAR TRACTOR** announces that a new plant, with 700,000 square feet of manufacturing floor space, will be built at an undetermined location

to produce motor graders and wheel tractors, and to provide more room at Peoria for crawler tractor and Diesel engine manufacture.

★ **HERMAN L. FELLTON**, formerly a vice president of **ORKIN EXTERMINATING COMPANY**, Atlanta, has entered business for himself at 15 Peachtree Place, N.W., Atlanta, as a sanitary engineering consultant.

★ **KENNEDY VALVE MANUFACTURING COMPANY**, Elmira, N. Y., promotes **CARL H. MORKEN** to vice president, manufacturing; and **THOMAS S. TURKINGTON**, controller, adds the duties of secretary.

★ **AMERICAN BITUMULS & ASPHALT COMPANY** establishes two new asphalt terminals, at Troy and Lyons, N. Y.

★ **BUCYRUS-ERIE COMPANY and INTERNATIONAL HARVESTER COMPANY** jointly announce an arrangement under which Bucyrus-Erie industrial tractor equipment will be sold, serviced, and distributed by Harvester.

★ **IN THE COURSE** of a major expansion, **JEFFERSON ELECTRIC COMPANY**, Bellwood, Ill., names **FREDERICK A. DELANY** sales service manager and **JOSEPH J. ARCHIBALD** advertising manager. For more data on this company see their **PUBLIC WORKS** ads.

★ **RCA VICTOR** elects **W. WALTER WATTS** vice president in charge of technical products; **THEODORE A. SMITH** vice president, engineering products.

★ **DR. ROGER W. ROTH** has been appointed sales manager, **Agricultural Chemicals Division, Velsicol Corporation**, Chicago.

★ **FOXBORO COMPANY**, Foxboro, Mass., has organized a Mexican affiliate. This is added to London and Montreal affiliates, making virtually the entire Foxboro instrument line.

★ **LINK-BELT COMPANY** has appointed **HARVEY V. EASTLING** assistant general manager of its Pacific Division, in San Francisco. **DONALD E. THAL** will be sales manager of this plant.

★ **SIGN** over a Birmingham street corner news stand: This is still the only country where any man can say what he thinks—and any other man can knock his ears down for saying it.



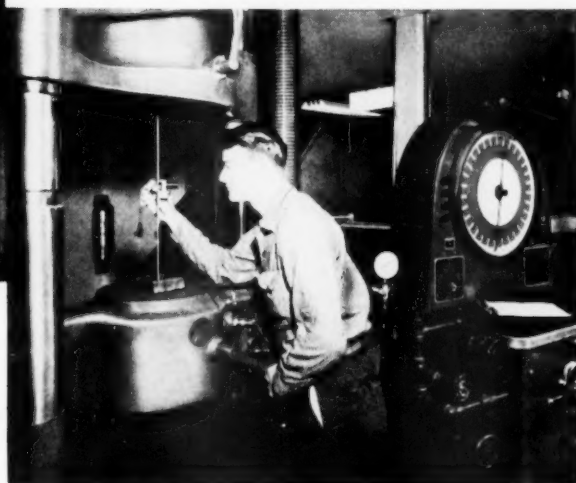
# ... a good pipeline

is the sum  
of good parts . . .



▲ Testing the compressive strength of a concrete cylinder

Testing the tensile strength of steel reinforcing wire ▶



The finest design and the most accurate workmanship cannot result in a superior product *unless* the materials used are of the highest quality. That's why Lock Joint assures the excellence of each of its pipes by constantly testing both the finished product *and* the individual materials used.

In the Company's research and testing laboratory reinforcing steel is tested for tensile strength . . . sand and aggregates are analyzed and classified . . . specimens of concrete in daily use are tested for compressive strength . . . gasket rubber undergoes varied and rigorous tests for

elasticity and durability . . . *all* ingredients are definitely proven before they are allowed to be put to use.

These carefully tested materials, together with Lock Joint's conservative design and precise workmanship, result in a finished product unexcelled in the pressure pipe field. If your project calls for pipe 16" in diameter or larger, designed for pressures common to water works practice, specify Lock Joint Concrete Pressure Pipe—the pipe that's tested from start to finish and backed by nearly half a century of pipe manufacturing experience.

SCOPE OF SERVICES *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply and Distribution Mains 16" in diameter or larger, as well as Concrete Pipes of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous Lines.*

## LOCK JOINT PIPE COMPANY

*Established 1905*

P. O. Box 269, East Orange, N. J.

PRESSURE PIPE PLANTS: Wharton, N. J., Turner, Kan.,  
Detroit, Mich., Columbia, S. C.

SEWER & CULVERT PIPE PLANTS:

Casper, Wyo. • Cheyenne, Wyo. • Denver, Col. • Kansas City, Mo.  
Valley Park, Mo. • Chicago, Ill. • Rock Island, Ill. • Wichita, Kan.  
Kenilworth, N. J. • Hartford, Conn. • Tucuman, N. Mex. • Oklahoma City,  
Okla. • Tulsa, Okla. • Beloit, Wis. • Hato Rey, P. R. • Caracas, Venezuela

**LOCK JOINT**  
*Reinforced Concrete*  
**PRESSURE PIPE**

there's  
an  
easier  
way



### TO OPERATE A SEWAGE PLANT, TOO

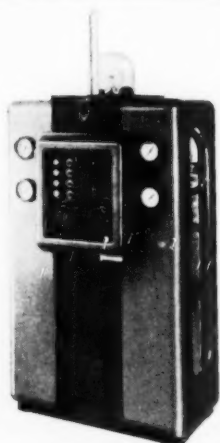
Modern equipment, such as a new W&T Visible Vacuum Chlorinator equipped for automatic or program control, can facilitate the job of operating almost any sewage plant.

For example, take a look at some of the jobs a W&T Chlorinator can do — and do well.

- Disinfect Effluents
- Control Odors
- Reduce Hydrogen Sulfide
- Prevent Sludge Bulking
- Reduce B.O.D.
- Improve Sedimentation
- Minimize Grease Content

Moreover, a W&T Chlorinator will ensure dependable, accurate chlorination with a minimum of attention and maintenance — another factor all operators appreciate.

S-71



W&T PROGRAM CONTROL  
VISIBLE VACUUM CHLORINATOR

## WALLACE & TIERNAN COMPANY, INC.

CHLORINE AND CHEMICAL CONTROL EQUIPMENT  
NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES